

# Caught by a Körting...

Les Lawry-Johns

I WAS standing behind the counter wondering why I had sold all those coaxial plugs for 18p when they cost me 19p (I don't study invoices half enough: after all, it's all I can do to keep you lot amused) when this fellow came in.

He said he had a Baird colour set and that a resistor had burnt out and his picture had gone a funny colour and could he have another one. He handed me a charred offering. "That's the thing".

"If you don't mind", I said with icy calm. "I've lost my crystal ball".

"Oh" he said with a disarming smile. "You mean you can't read the value. Don't worry, there were two more of them so I took one out so you can match it up". He showed me a shiny 1.5k $\Omega$  1W resistor. "Ah", I said with something of a snarl in my voice, "what happens if the new one burns out too?" Voice rising "and pray why shouldn't it".

His smile made me ashamed of this outburst. "I thought you'd say that. That's why I put the set in the back of the van. I'll go and get it".

He returned in a trice, carrying the set far too easily for it to have been an old Baird one – but it didn't look much like a Thorn set either.

"It's German", he said. "Nice, isn't it? It's a Körting actually". "Kurting", I said loftily. "Don't you know nothing?"

So, saying he'd call back in an hour, he went – not telling me where the resistors had come from. Well, I looked over every panel and subpanel which could affect the colour rendering, mainly around the BF179C colour-difference output transistors which, on a 51763, are on a plug in subpanel, but no sign.

To cut it short, I eventually found where they lived. On the tube base panel, and on the component side which is the side away from you of course. There was one 1.5k $\Omega$  resistor in series with one cathode (see Fig. 1) with the other two missing. The position of the blue 1.5k $\Omega$  series resistor was scorched, so we put back the red one and checked around the blue circuitry. Nothing wrong cold. Switch on and see the effect. Weird it was. With the brightness down, a dull blue raster remained. With the controls at the normal settings and an aerial connected, lovely lots of red and green. Nothing wrong around the blue cathode, no shorts, no excess voltages, nothing to burn out a 1.5k $\Omega$  resistor.

So we put in another one. Lovely. Turn off the colour, turn down the brightness and set the first anode controls for a nice grey scale, set the drives, perfect.

Ponder. The resistor burnt out. Obviously an excess voltage across it. Where do it come from, where do it go? Spark gap shorted? No. Tube shorting? Again no.

H.T. short? The resistor wouldn't have suffered from this unless the spark gap was short-circuit. But it wasn't, while the BD115 was quite cheerful. Oh dear. But wait, here comes the bloke back again.

"Done is it?" he beamed. "Well done. I knew you'd do it".

"Well, er, you see, in fact it's not quite that easy".

"Rubbish, you're just being modest, the picture's perfect".

Regaining some of our normal arrogance we pointed out that the picture might well be perfect now but at any time the beast could well rise from the depths again, gobble up the poor old resistor and submerge to lie in wait for the next victim. But he could take his set if that's what he wanted....

Well, to stop indulging in all this imaginary chit-chat, back he came a few days later to ask if he could buy two 1.5k $\Omega$  resistors as the same one had burnt out again. He hasn't yet brought the set back, preferring to replace the resistor rather than (he says) to have a new tube fitted because he is convinced that there is an intermittent short in the tube....

## Körting Again?

The model we have been going on about (51763 series) has proved quite a reliable set really apart from the odd valve and diode failure, but the first generation one (8455 series) was a different kettle of fish. It had its share of shorted diodes and faulty transistors etc. but the one big failure was in the transformers. It had a line output and an e.h.t. transformer and both gave a lot of trouble until they were modified. I think they were of Philips design but I could be wrong. Insulation breakdown was the trouble and the snag was that the customer didn't take kindly to forking out for a new transformer one month only to have the other cook up a month or two later. Not cheap items either.

These sets had two colour controls on the front. The left-hand one was the normal saturation control, the other the hue or drive adjustment. They had sliders, with the optimum point in the centre. It's quite common for the hue control to develop poor contact, with the result that at one moment everyone looks healthy but at the next they look decidedly seasick.

The tuner units were also a bit complicated, being designed for u.h.f. and v.h.f. reception. It's often necessary to attend to the switch contacts in these and to knock off the v.h.f. side while you're at it. One of the advantages of doing this is that a fairly heavy spring can be left off and this takes quite a lot of strain out of the unit and the button selection.

## Finlandia

Lovely music that. Old Syble something or the other (I

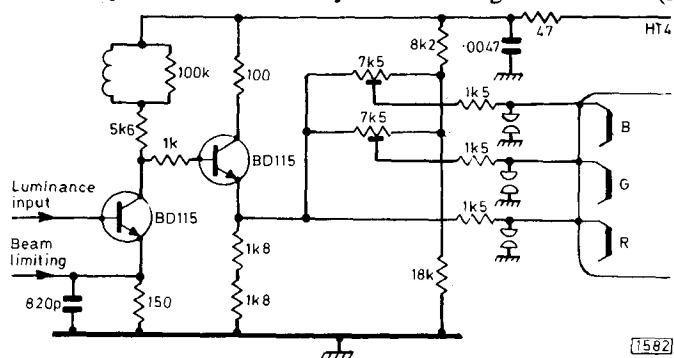


Fig. 1: The luminance output stage, Körting 51763 chassis. In many sets the 7.5k $\Omega$  drive potentiometers are omitted.

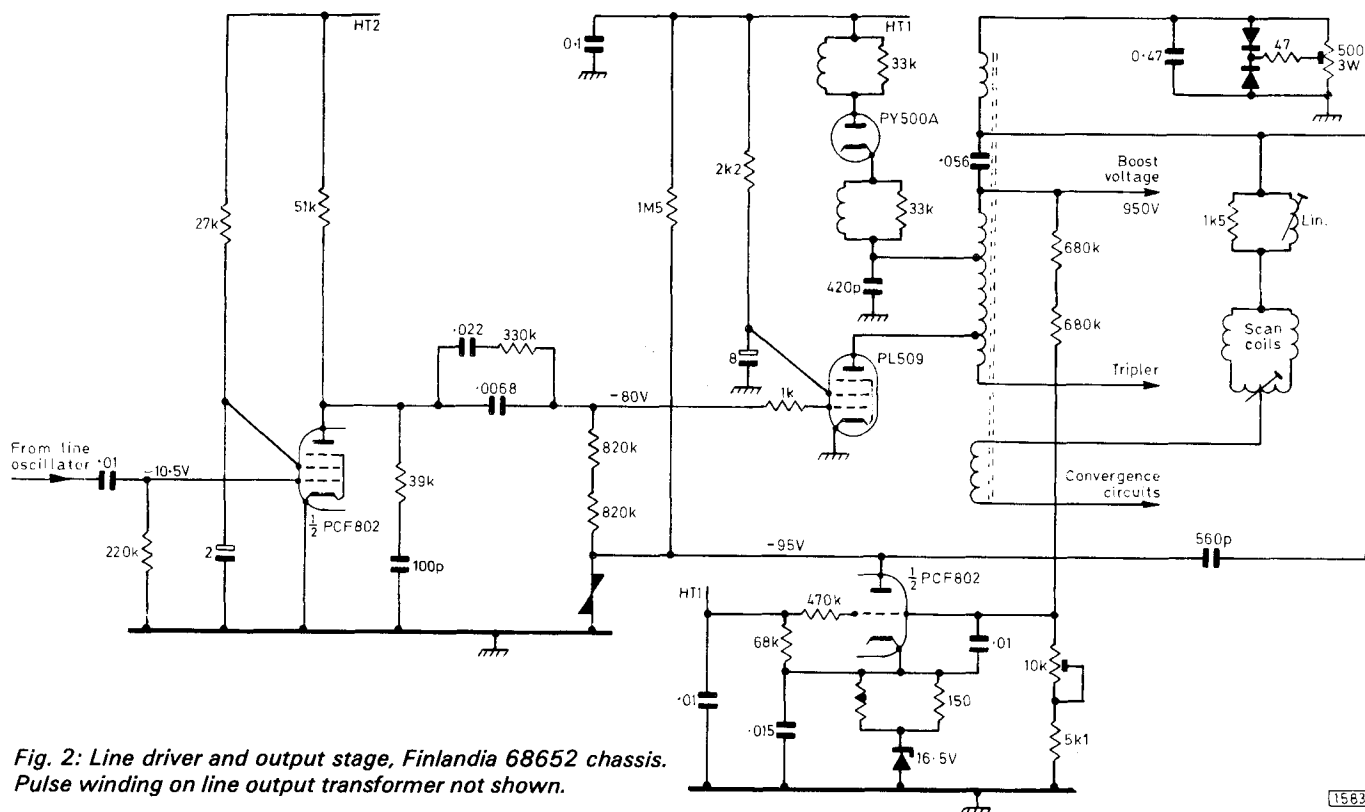


Fig. 2: Line driver and output stage, Finlandia 68652 chassis. Pulse winding on line output transformer not shown.

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know my music mate, so don't start getting uppity about it). Anyway quite a few of these nice sets (68652 series) have graced our bench so perhaps a few words about them might not come amiss.

Most of them come along via the ex-rental market, from Granada. So they have a few years over their heads, and are of hybrid design with only three valves.

The PCF802 is not the line oscillator, so watch that one. The pentode section acts as a driver for the PL509 line output valve while the triode section acts as a stabiliser, with of course the PY500 as the efficiency diode (see Fig. 2). The line oscillator is transistorised, with a pretty complicated circuit which with the line sync filter etc. adds up to quite a few components to think about. Not much seems to go wrong here however, so another load is lifted from our excessive burden of funny fins to fink about. The small electrolytics and the 2.2M $\Omega$  discriminator load resistors should receive attention first when things do start happening to the line hold. The 2.2M $\Omega$  resistors (RB96 and RB97) are connected to either end of the line symmetry (discriminator balance) control PB7.

Probably the most common fault on these sets concerns the RGB output transistors, which are of the BD115 type. They can short or become open-circuit or be damaged by sparking between tracks, this again being quite a common thing. They drive the c.r.t. grids incidentally, with the c.r.t. cathodes being linked together and used for flyback blanking and beam limiting.

Trouble spots will also be found in the supply lines. There are four separate diodes in the h.t. bridge and a block type diode bridge for the l.t. supply. One of the separate diodes may short and blow one or both of the 2.5A supply fuses, or may pop off the surge limiter RB189 (4.7 $\Omega$ , 9W) which can also fail when CB102 (0.1 $\mu$ F) across the bridge goes short-circuit.

In short, there is very little to worry about. It's one of those sets where you don't have to spend hours studying the circuitry in order to trace a fault, and I must confess that I have little detailed knowledge of the design because it's

never been necessary to delve too deep in order to keep the customers happy. Perhaps it's something to do with all those funny baths they keep on having up in Lapland.

Some of our set designers could do with a few. Someone comes up with a circuit which saves a couple of bob and then it has to be surrounded by gadgets to protect the thing from the effects of it going berserk. It's in the nature of things that these gadgets are in themselves so inherently unreliable that the protectors need protecting (bung in another thick film overvolts unit Joe).

What was wrong with a separate stabilised power supply feeding various parts that could be separately isolated in order to put things right in the least possible time? Do the setmakers pay us to put their products right when they go wrong almost as soon as they've been installed? One or two allow a small percentage, but this amounts to only about one service call. Better by far to build sets with reliable components and to have them in a design which doesn't require a genius to understand — because most of us service people are not geniuses and aren't even particularly bright (I speak for myself, so no abuse please).

In short, what I am saying is that some designs should have been left deep in the heart of Texas. By all means use the latest short neck, quick heating, in-line gun tubes, but for heaven's sake use them in a proved and relatively simple circuit so that morons like me don't have to sit in the toilet half the night trying to understand which bit does what and why all over again every few months. End of plea.

## Back Comes the Körting

Since starting these jottings the bloke with the Körting has returned and, yes, it turned out to be an intermittent heater-cathode short in the blue gun. But a new tube wasn't necessary: we simply removed the earth connections from the tube's heater supply, which is provided by a secondary winding on the mains transformer, and ran an extra lead to the c.r.t. base panel. Fortunately the winding has a very low capacitance, so there's no loss of picture detail at all.



# When You Meet a Stranger . . .

*Les Lawry-Johns*

DEALING with colour sets you've either sold or serviced regularly is one thing. Dealing with a colour set you've not seen before is a different kettle of fish altogether and requires a different approach – particularly if it's getting on a bit. You might say it's much the same thing as buying a second-hand colour set, which is true except for the economic factor. It's one thing to buy a used set and go through it from stem to stern to restore it, with loving kindness, to its original condition – if nothing else in order to obtain a good deal of job satisfaction from doing this. When one is presented with a strange set purely as a quick servicing job however, probably with a ceiling price of a few pounds, a different problem emerges. It's one which has given us pause for thought on many occasions, and no doubt will, or has, you.

There are two viewpoints to consider. The set owner or customer – if you're not the owner – whose primary considerations are to get the set back into working order as quickly as possible and at the least possible cost. And yours, if you're the repairer, whose primary considerations are to get the set working properly as quickly as possible with no come backs and hopefully to show a small profit on the deal. Unfortunately, meeting all these considerations is only rarely possible, so some compromise has to be reached. In reaching this compromise one has to consider a couple more points.

If you succeed in pleasing the customer you will almost certainly meet the set again. Therefore the initial repair should be carried out bearing in mind that it is going to be your baby from now on. But do you want this particular baby?

If you do it may be as well to suffer some initial loss of time and money so that you can service it efficiently and profitably at a later date and obtain a regular customer with probably their word of mouth recommendation to their friends and relatives . . . which may or may not be a good thing.

It's absolutely astounding what some people will look at in the name of colour television and what they consider an acceptable picture. They'll continue to look at a frightful jumble of images on the screen, and only cease to do so when the thing fails completely.

So when it's presented to you the owner has the viewpoint that "the picture valve has gone" or "a wire has come off", and you have the problem of what to do and what to leave undone.

## **A Case in Point**

This was brought home to us most forcibly only the other day. We were asked to call to see a Bush Model CTV182S. The complaint was that the picture had failed, leaving the sound normal. Now this could be due to almost anything, so bearing in mind the fact that we hadn't seen this particular set before and that time was limited we packed our bags with care, leaving out only the kitchen sink. Pondering for a

moment, we put the kitchen sink in just in case and started off.

On the way we also pondered upon another aspect. Here we were, driving an expensive vehicle loaded with expensive gear to enable us to deal with almost any contingency, all of which had to be paid for in advance and with a great deal of thought from an ordering point of view, so as to satisfy someone who would probably say to another someone "They don't half know how to charge nowadays, they want four quid just to set foot over the doorstep".

Dismissing these dismal thoughts, we set foot over the appropriate doorstep and confronted the Bush colour set. It wasn't a burning Bush by the way, and it wasn't up a mountain either. Switching on confirmed that the sound was in order. But there was no sign of e.h.t. (no friendly rustle when the set was switched on). A quick check revealed that most supplies were in order – 200V at the h.t. fuse, with most of the l.t. lines intact. There was no 20V supply to the scan drive panel however, due to the 6.8Ω feed resistor 8R2 being open-circuit – quite a common one this, with no contributory cause.

Replacing 8R2 restored a picture. But what a picture. Lacking an inch either side, colours anything but right, convergence a mile out. "Oh that's lovely dear", said the lady of the house. "That, madam, is not strictly true", we said bitterly. "The colours may be lovely but they're not where or what they should be."

This was to put it mildly, but we had no desire to spend an hour or more doing things we hadn't been asked to do. So we tweaked up the convergence and left the reds pink and the blues mauve. Cowardly? No, just prudent.

## **Sets Brought In**

Similar sorts of things occur regularly with sets brought into the shop. The proud owner will loudly proclaim that his set has never given a spot of bother and that only now has a fuse or something gone. When you have painstakingly put together the upper right side power supply panel (GEC 2028 series) in order to get the set working you may find a dull, poorly defined picture of a pinky green hue when it should be black and white, changing to mauve as the brightness is advanced. Any attempt to set up the grey scale is doomed to failure from the outset and tuning in a colour transmission is a laugh.

"That picture was perfect before it went off", maintains the owner. "Well it wants a new tube for a start, and then a lot of work done on it after that", you confide. "No, I'll take it as it is: it suits me and the missus."

## **The Basic Problem**

So there it is. This is what you may well come across when you meet a stranger. Better the devil you know. . . .

Having accepted this truism, the basic problem remains.



dead as a bottle of light ale with a leaky top. Sometimes you may be lucky enough to see a pretty little bright spark at the point of fracture.

Anyway, either you have the correct replacement at hand or as a temporary expedient you can disconnect the section and fit two 33 $\Omega$  RS dropper sections in series. These are the thick ones with a rating of 0.7A, so they are well within specification. We say these items because they are the ones most likely to be in the spares kit, also because they do the job well.

Now: having restored the supply, your next action must be to ensure that it is correct. The voltage at the two fuses on the rear edge of the upper left panel should be 205V – no more. If it is set (by R1370) too low, all sorts of funny things can show up. Not only lack of width, as you would expect, but also some pretty weird effects too numerous to describe and varying with individual sets.

Having made sure that the voltage is right you are permitted to look at the picture. If you are lucky it may need only a few fine touches to produce a good black and white picture with the colour off, and if this is so the chances are that when the colour is turned up everything will be fine. If this is a stranger however it is equally on the cards that at least part of the convergence procedure will have to be carried out in order to achieve acceptable results. We mention convergence in particular because this is the thing that's most often found to be way out yet not mentioned by the customer. In all probability only a few tweaks on the right controls may be needed, but there are times when no amount of adjustment will produce an acceptable picture.

In such cases you can save a lot of time and patience by checking a few items on the convergence panel. There are three AC128 transistors and four small electrolytics on this particular panel (see Fig. 2). Disconnect each and check it with an ohmmeter. Very roughly you could say that the suspects are the ones nearest the controls which will not come into line. It can save a lot of time if you check the lot plus the controls themselves however – this can be done quite quickly. Faulty electrolytics on the convergence panel are more common than one may think, possibly because they are often ignored.

## Blown Fuse

Now let's go back to that 3.15A input fuse (FS1387). Say it's not clean. Say it's a nasty black colour. Here you take a different course. First check the other fuses to make sure that some joker has not put a heavier fuse in a position where it is clearly marked, say, 800mA. Remember that you haven't seen this set before, so you can't take chances. If they are all correct, the cause of the blow out is almost certainly a shorted thyristor or a shorted mains filter capacitor (C1366). Check the thyristor first. If it's at fault there will probably be a short from its anode (body on a BT106) to its cathode (the longer prong). If the thyristor is in order and there are no other obvious shorts it is reasonable to suspect the large blue and white or plain blue filter capacitor which is wired on the reverse side of the input fuse panel.

## Worn Tube

Having restored the set to an operating condition, what might we find this time? Remember the set was in working order before it failed altogether, therefore the sound is most probably in order and some sort of picture must be on the

screen – and in this instance we'll consider that the set may be of any make.

We have already mentioned some of the effects of a worn tube. Wrong colours which can be put right at one setting of the brilliance control but change due to the differing emissions of the three guns. In addition, one or two colours may spread out as the brilliance control is advanced, making good convergence an impossible task. Even worse, one colour may be present at only the lowest brilliance setting, not responding as the control is advanced even though the tube base voltages may be spot on.

To clarify this, let's say that at normal brightness the picture consists of only two basic colours, say red and blue to make magenta, or purple as the majority of people describe it, green being absent. Turning down the brightness may restore a faint vestige of green, and turning the red and blue first anode supply switches off may leave a green background with faint flyback lines which cannot be controlled by adjusting the brightness. If you've checked the tube base voltages, the answer can be only an open-circuit electrode in the tube.

## Back to the G8

Returning to the G8 chassis, let's assume that the complaint is one of no picture and no sound but the tube heaters are glowing. This means the input fuse is intact. The fuses on the power unit may all be intact, but it may well be that the 800mA fuse (FS5557) on the right side line scan panel has blown.

In this case we must proceed with caution. Disconnect whatever can be done without. The first and most obvious choice is the tripler, which needs only to be pulled off the nipple on the line output transformer. Indeed you may hit the bullseye first time. The tripler is often the cause of the fuse on the line scan panel failing, but often it isn't. It's worthwhile checking the two line output transistors (see Fig. 3) on a meter in the usual way (for collector to emitter shorts etc.) Also make a quick check on the diodes and their attendant electrolytics.

One would normally do these things of course but one item which is often overlooked is the pincushion correction transducer (T4485). This is on the right side of the lower right side timebase unit, and appears to be a small transformer with three separate windings. It could well look a little poorly, with little bubbles of discoloration on one or more of its windings. If there is doubt, merely pulling out the red plug H – from the line scan unit to the timebase panel – will prove the point as the set may then function quite well without the transducer being in circuit. This happens not nearly so often as say defective line output transistors, a defective tripler and the like, but it's worth bearing in mind. So removing plug H is an essential part of the "clearing the decks operation" when checking for shorts which have blown the fuse on the line scan unit.

Another defect which may be obvious after the original complaint has been cleared is lack of width. Be careful with this one, because it can hang round your neck like a stone. You've already checked the supply voltage as part of the initial operation (haven't you?). Therefore your trouble is almost certainly on the line scan unit, although the line oscillator components are on the lower right timebase panel. If you have a spare line scan unit it is only a matter of plugging this in to prove the point, and this action will almost certainly restore full width and leave you with the problem: what to do, what to do?

It is a fairly easy job to replace the line output transistors, and whether these are BU105, BU204 or BU205 types we

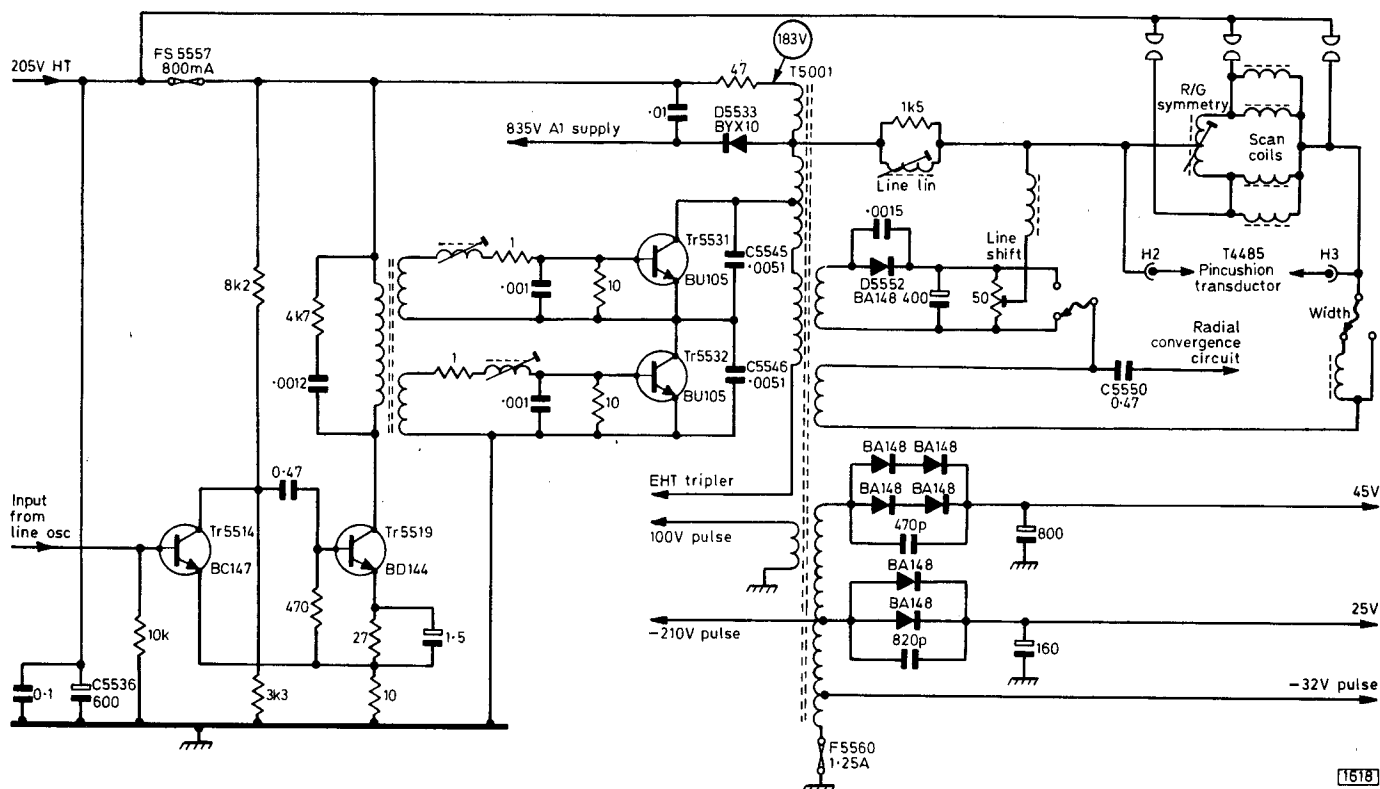


Fig. 3: The trigger amplifier (Tr5514), driver (Tr5519) and line output stages. The beam limiter circuit is also mounted on the line scan panel but is not shown here. There have been several production modifications.

keep 2SC643A types in stock since they replace all these and a few others and so are very handy transistors to have around. But it's quite likely that the transistors are not at fault. You can check the capacitors, and the trigger amplifier and driver transistors, but by this time it will be sinking in that the culprit is that thing on the rear end with all the windings on it. Yes, just one shorted turn is all you need to cause the transistors to pass excessive current and dampen things down a bit. Now tell the customer how much that nice simple job is going to cost.

particular area. With this in one hand and your aerosol freezer in the other, heat up the area of can 008 which is next to the CAQ370 crystal, to the left of the luminance delay line (see circuit, Fig. 4). If this causes the colour to drop out just check the setting of the core of 008: half a turn may restore the colour no matter how much heat and freezing is applied. You may need a new crystal or maybe any number of other things, but it's worth checking the core first to save an awful lot of time and frustration.

## Colour Drop-out

One of the habits of the G8 is for the colour to disappear suddenly after several hours of faultless performance. This can be very irritating and time consuming since it won't happen (probably) when the back cover is off. It can be due to a lot of things, and we don't propose to list them here. What we do propose is that you hare off out and get yourself one of those small hand-held hairdryers with a narrow nozzle on the end to concentrate the heat on to one

## It Didn't Do That Before!

Talking about frustration, say you've been called in to do a job and this has involved swinging up the chassis and lowering the side supports to prop it into the service position. You've done the job you were asked to do, so you lower the chassis down and switch on with a satisfied smirk on your face. Maybe the picture does come on in glorious colour, but the sound which was perfect before isn't there any more. "The sound was all right before you came" says the lady of the house, and so it was. The point is that all too often a potential sound fault has existed ever since the set was new, but it just needed you swinging up the chassis to show it up.

It may be only a loose fitting sound output plug and socket (follow speaker leads to the front end), but it could well be a joint which was never soldered properly in the first place. A prime source is the intercarrier sound i.c. which in the earlier models was of the round variety (TAA570). Time after time we have found one leg improperly soldered, just lurking there waiting for you to be the one to disturb it.

Mind you, things like this can happen all over the place and needn't concern the sound. If it's difficult to trace, a little judicious tapping around will often reveal the source of the dry-joint or whatever and temporarily restore what was missing, be it a primary colour, line hold or what have you.

This is the sort of thing that can happen when you have dealings with a stranger. So be warned!

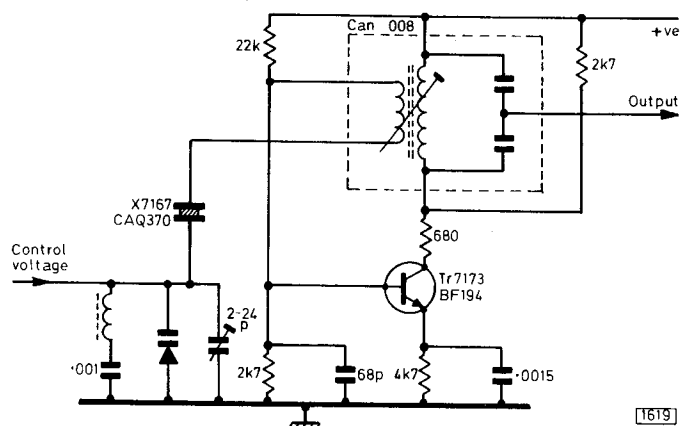


Fig. 4: Decoder reference oscillator circuit.

## ***In Puffed a Couple of Chaps...***

## Les Lawry-Johns

We had a couple of Japanese portables in recently, both with cracked tubes. What a pricey job this is. One is well advised to check the current price of these tubes, plus the VAT, plus the carriage, etc. before giving an estimate. Anyway, we had just about wrapped these up and were wondering why these Far Eastern jobs have such heavy mains leads – one of them could have easily run a washing machine, the other tied up the QE2 – when a van pulled up outside.

In puffed a couple of chaps carrying a large Ultra colour set. We chatted about this and that and it transpired that the trouble with the set was “a poor picture with lines shooting across it.” Having arranged a convenient time to collect it, the owner and his son in law departed, leaving us with what appeared to be a straight-forward job. Unfortunately, having got the set on the bench we found that one or two other things appeared to be wrong. To be quite candid about it, and with the benefit of hindsight, practically every nightmare that can afflict a Thorn 3000 chassis was present on this one. So sharpen your pencils and take a few notes. Who knows, the same (not all we hope!) may happen to you!

**No Raster**

With the set up on the bench there was neither picture nor raster, but there was a funny arcing noise every now and again from the beam limiter board. On trying to take a voltage measurement across R907 (see Fig. 1) we found that it was loose. This is one of the key test points on the chassis as it shows the current taken by the line output stage: the voltage across the  $1.5\Omega$  resistor should be  $1.3V$  if all is well. If the reading is higher, either the timebase is taking too much current or the resistor has risen in value. You may say that a low-value wirewound resistor does not change value. But it can, and has on more than one occasion to cause loss of brightness. This time however it was loose and the solder had decomposed.

We soon made this good and confidently switched on. Nothing doing, no voltage here at all. We then checked that the supply was in order, on the power board – about 60V at F603 – and followed the supply along to the collector of the line output transistor. Upon looking at the underside of the transistor however we found some hideous blobs of solder on the base and emitter pins, and touching these with a screwdriver brought the e.h.t. crackling up. Switching off we also noticed some drops of solder on the decoder board, which is underneath. So we dutifully cleaned off the transistor pins, made good the soldering, and cleaned up all (we thought) the little bits of solder on the board.

### *The Tearing Lines Appear*

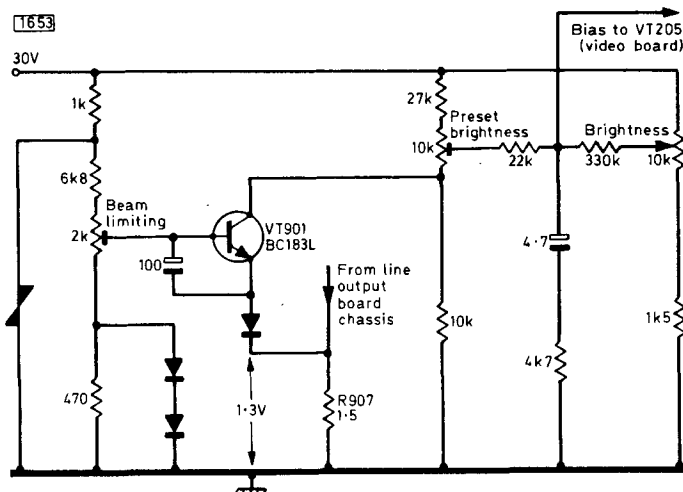
Now on switching the set on the e.h.t. and raster appeared but on plugging in an aerial there was only a very poor monochrome picture (in a nice shade of yellow) with severe interference in the form of tearing lines. This was what the man had said of course: the rest must have

resulted from vibration during handling showing up the dry-joints.

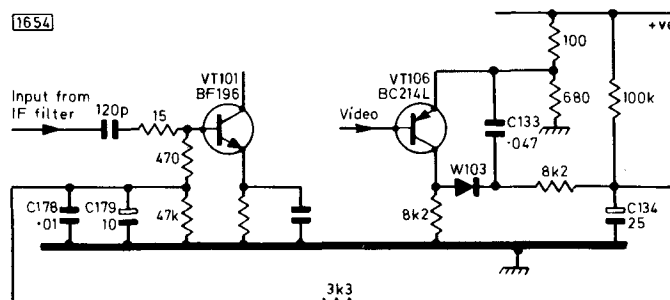
So we next turned our attention to the left side i.f. panel. Now you cannot quarrel with the layout of this panel. The transistors are clearly marked and are easily found, along with all associated components. A pleasure to work on.

We were not certain of the nature of the fault, and decided therefore to short out the input signal and see if there would be any sign left of the disturbance. Connecting an  $0.01\mu\text{F}$  capacitor from the base of the first i.f. transistor VT101 (see Fig. 2) to either its emitter or to chassis would, we thought, knock out the signal. It didn't, but resulted in a lovely clear picture, free of interference. Oh dear. Taking off the capacitor brought back the interference and the poor picture. For the want of something better to do we then used it to short the collector to chassis. Lovely picture!

We then concluded that we were up against an a.g.c. fault or an open-circuit decoupler in the supply line. Checking the latter didn't help much but bridging C179 seemed to help – bridging it with an electrolytic that is, not with the 0.01 $\mu$ F capacitor, twit. Moving down the chassis, we next bridged C134 and this cleared the condition. Now when the base of VT101 was bridged with the 0.01 $\mu$ F capacitor the



**Fig. 1: The beam limiter circuit, Thorn 3000/3500 chasis.**



*Fig. 2: The first controlled i.f. stage VT101 and the a.g.c. detector/amplifier transistor VT106. C134 was omitted in later production chassis.*



the previous well known list of stock faults apply a little less and one now encounters the effects of heat over an extended period, corroding contacts etc. – as indeed we mentioned in the case of R907 on the beam limiter board. It's also worth while having a look at the timebase board, which is revealed in part when the beam limiter board is lifted. Particularly in older models, there is often quite a bit of corrosion around L502 and R528, whether W507 is fitted or not – these components are in the power supply feed to the line driver and output stages. A clean up job here can save trouble later.

Similar remarks apply to the power supply board, where the wirewound resistors are now tending to part company with the print – and it must be admitted that it's not easy to work on the underside of this panel. Our experience shows that the items likely to require replacement on the power supply panel are the chopper transistor itself (VT604) – remember to check its insulating washer, which can be punctured, and clear away any corrosion – the wirewound resistors (check all for continuity), the electrolytic capacitors (particularly C607), the 30V zener W605, and transistors VT601 (30V stabiliser) and VT605 (chopper driver). Smaller components likely to escape attention but which we've found troublesome include C631 (0.01 $\mu$ F) in the driver's collector circuit and C622 (0.022 $\mu$ F) and W618 in the feedback amplifier circuit.

Whilst line output stage failure due to faulty line output transistor(s) or the tripler is pretty obvious and easily checked (for example by merely pulling off the tripler lead from the transformer) there are other and more obscure line timebase troubles. For example, intermittent loss of line hold is often due to the small electrolytics C506 and C511 playing about. The two can be replaced in moments and there is no point in holding a conference about whether they are faulty or not or which. Oh yes, when soldering the line output transistor(s) make sure that no solder falls on the decoder panel...

The convergence panel has been subjected to consider-

able alteration as far as the layout is concerned, but the same basic comments apply. A little scorching here and there, shorted diodes or electrolytics, defective potentiometers and of course our old friends the first anode switches which tend to leak, thereby robbing the relevant c.r.t. first anode of its voltage and resulting in the absence of that colour (usually green, remember ... ?).

We have said that the sudden drop out of a certain colour is often due to low first anode voltage on the c.r.t. gun concerned. The trouble is quite often that one colour comes up far too bright however, so that all that can be seen is an almost blank screen of that colour, making it difficult to see picture information contributed by the other two colours. A quick check at the tube cathodes will often reveal that although there may be about 160V on two of them there is precious little at all on the other. This immediately throws suspicion on the collector load resistor of the output transistor concerned. Earlier models used separate wirewound resistors (R250, R264 and R277). Later versions use a pack with four lead-out wires, enabling the unit to be stood off the panel. It appears that this thick-film unit is not as reliable as was at first hoped, and we fit separate resistors as required.

### Intermittent Colour Drop Out

This is not a servicing article on the 3000 chassis however, so we had better not carry on too much about these sets. We have a 9000 series set which suffers from intermittent colour drop out. The slightest vibration restores colour (you've only got to blow on the cabinet and the colour comes back) and you can't make it go off no matter what. All plugs, sockets, leads and soldered connections have been checked, probed and prodded. No result. The colour stays for hours after intensive searching and then drops out. Can you hear me Ray? Rayyyy ...

## A Simple Soldering-Iron Stand

Malcolm Burrell

ACCIDENTS with hot soldering irons can be annoying at the least and both expensive and embarrassing at the most! In the home workshop, on the kitchen table or in the field some form of stand is desirable. The one shown here is just as efficient as many commercial models and was devised and built in half an hour.

It consists of a length of tubing, for example  $\frac{7}{8}$ in. aerial mast, hammered flat at one end which then has two holes drilled in it so that the tubing can be mounted on a stout block of wood or screwed directly on to the bench. All sorts

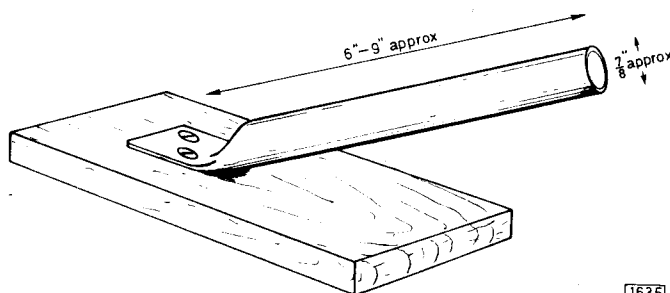


Fig. 1: The soldering-iron stand.

of variations are possible. A double unit to accommodate both a standard and a small low-wattage iron can be constructed for example, while a length of tubing mounted in the tool box provides a convenient stand which will protect other tools – and customers' carpets!

A hardboard cheek can be mounted on the lid of the tool box so that a long lead can be stored on the outside, giving more space for tools and essential spares inside. If the electrical installations in your area are not too diverse, fit a plug to the lead: a useful arrangement is a two-pin 5A plug with a 13A type razor adaptor.

If your soldering iron's bit is not of the fixed type it's a useful habit to give it a twist every time you plug the iron in: this ensures that the fixing does not seize and facilitates replacement of defective bits without having to scrap the element as well.

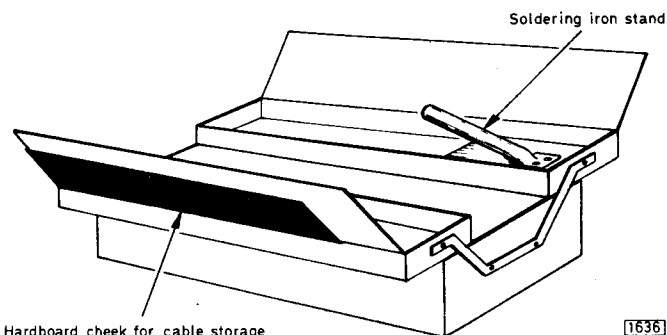


Fig. 2: Metal tool box adaptations.



## ***A Day in the Life of...***

## *Les Lawry-Johns*

**07.30 Open eyes. Think about coming day. Close eyes.**

**07.45** Open eyes. See cat sitting by bed waiting to be fed. Get up. Kick cat and visit bathroom. Dress and proceed downstairs preceded by cat. Say good morning to dog. Pick up morning paper and find rates demand plus a letter from the editor asking if we would like him to send us a new ribbon for our typewriter because he can't understand half of what we write and the half he can understand doesn't make sense anyway so would we like a typist as well?

**07.50** Feed cat. Put on kettle and take dog for walk across road on yonder green. Throw sticks for dog. Find sticks for dog. Say good morning to passers by. Wish we had put on wellies as feet are soaking wet.

**08.00** Return for breakfast. Say good morning to most beautiful girl in the world (who will read this). Read paper, at the same time listening to most beautiful girl talking about something or other. Go to toilet: read final rates demand.

**08.45** Open for business. First job, fit regunned tube in 24in. monochrome Philips set. Correction. Try to fit tube, but cannot undo nuts holding old tube. Box spanner wrong size. Succeed with pliers, injuring hand. Complain to most beautiful girl who says "You should have let me do it".

**09.00** Test Philips set. Goes into lines after five minutes. Change ECC82 line oscillator valve to cure.

**09.05** Sell razor adaptor to man from Australia who says that things seem upside down here.

**09.10** Try to ring Mullard Limited about colour tube worn out after three years by woman who leaves set on from early morning till late at night for company (tube insured for four years). Fail to get Mullard Limited. Phone out of order. Go next door to ring 151 and speak to nice engineer.

**09.15** Two ladies carry in colour set, GEC Model C2111. Complaint: blows 3-15A mains fuse once per week but present trouble is no sound this time after replacing 3-15A fuse. Male member of family arrives and fills in gaps in story. Brother-in-law has serviced set up to present but never found reason for 3-15A fuse failing. Brother-in-law has gone to New Zealand, leaving good supply of fuses. Picture apparently pulsates prior to fuse failing.

Investigation reveals that the 24V line 60Ω wirewound resistor R603 (see Fig. 1) by the side of the line output stage has sprung open, thus removing the supply to the audio amplifier i.c. No shorts, no reason. Solder up resistor. Switch on. E.H.T. rustles up. Sound o.k., but no picture. Brilliance has been turned down! Turn up, picture o.k.

Now stop and think for a moment. If R603 springs open, it is overloaded. What by? The audio i.c.? Unlikely. When they go they go (they don't come back). The 24V zener? Well yes but. What else? The picture pulsates. What does that mean? Varying in size and brightness, i.e. the h.t. supply is fluctuating. What else? The 3.15A supply fuse fails regularly, apparently without cause. Add this lot up. There is a sudden rise in voltage which normally blows the fuse and can open the 24V supply because the zener is trying to cope with the sudden rise in voltage. Who's to

**blame? What's his name? Thyristor. That's it, the BT106. Take out the centre supply panel, remove the BT106 and fit another. No more trouble to date.**

**10.00** Involved tussle with a Hitachi car radio which in the first place had only required a loudspeaker but has now burnt out the tracks to the output transformer secondary and the output transformer secondary winding to boot. Make up and fit a suitable transformer with revised secondary output to speaker, and advise customer to recheck wiring in 24V lorry supply so that the 12V used for the radio comes from the battery nearest earth and not the 12V to 24V one as one side of the speaker connects to radio earth which may not be the vehicle earth and the speaker may be running to earth and this is not good. Sort that out.

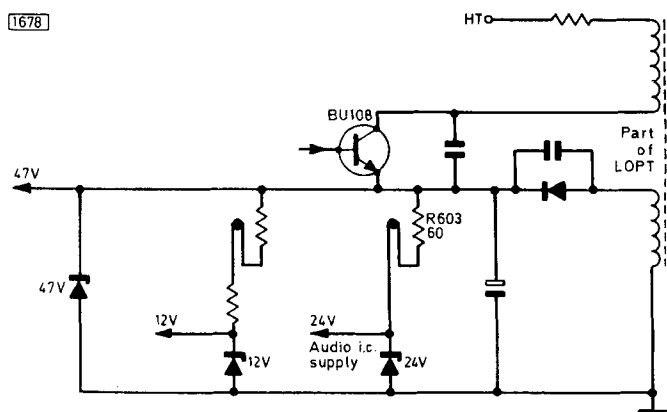
**10.30** Dog takes duster from under counter and wants to play. Avo falls to floor, exit dog. Female half says we shouldn't take our nasty temper out on the dog just because the sets won't go right. Beautiful girl no longer beautiful. From now on just she. She's made a cup of coffee. Not a bad girl really.

**10.40** Bush Model CTV194. Big flash from power panel on switching on. 8TH2 (mains input thermistor) doesn't look good. Fit new one. Switch on. No flash but no results as there is no l.t. supply. Output from bridge o.k., but is not present at filter resistors at top of panel. Remove panel (again) and trace crack across track coming up from bridge. Repair and try again. O.K. except for hum bar. Tighten screws securing panel, no hum bar.

Sudden bright spark from right side panel, smoke from transducer 6T3 (see Fig. 2). Fit new transducer. Picture now only a couple of inches high, with bright line top and bottom. Check this, that and the other, only to find eventually that there was a dead spot on 6RV4 which is just above the transducer. A slight touch restored normal scan.

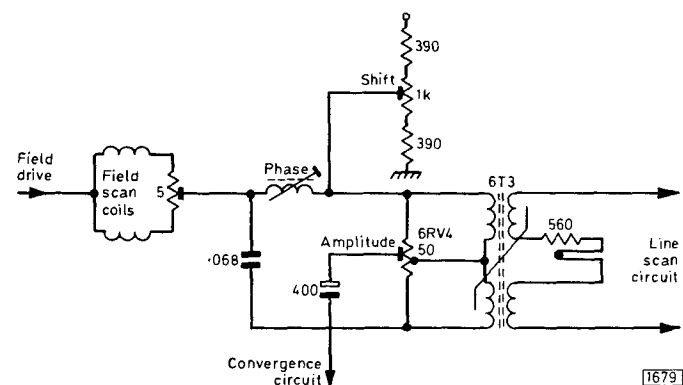
**11.05** Spend some time showing on paper how to provide two coaxial outlets from one aerial to gentleman who could not or would not understand whilst his two unruly children tear place to pieces chasing cat and dog.

**11.30 Gentleman leaves, taking reluctant offspring, having purchased one coaxial plug.**



**Fig. 1: What kept blowing the mains fuse, and made R603 go open-circuit? GEC Model C2111.**





*Fig. 2: Bush Model CTV194. The transducer 6T3 went up in smoke, then 6RV4 caused nasty things.*

**11.35 GPO engineer calls to check phone. Fault on external line. Climbs up pole to fix. Phone Mullard Limited.**

**11.40** Dismantle car radio. Replace fairy light used as dial lamp. Check output and find driver transformer open-circuit. Fit new driver transformer, using half a reel of desoldering braid as there doesn't seem to be a shortage of solder in Hong Kong. Assemble radio and test. Assorted whistles on medium wave, normal for this type of set.

**12.00** Dismantle Ferguson 3816 portable. L.T. fuse blown. Check all circuits, no shorts. Fit new fuse and switch on. L.T. voltage 15V instead of 11.5V. Tube lights up like light bulb. Check regulator transistors VT21 and VT22 and all associated components. No fault. Set regulator to produce 5V at base of feedback transistor VT22. L.T. line now normal, with tube heater nice and dull. Surprise: picture is good black and white, no sign of strain. Question. Good picture at correct voltage means that the incorrect voltage could not have been present very long. Why the sudden rise with no apparent cause? Decide to put the set on soak test and keep an eye on the glow of the tube heater.

**13.00** She shouts out “come and get lunch”. Lunch only interrupted three times by phone making up for lost time.

**14.00** Nice chap brings in old Bush (second set) v.h.f. only model. Find faulty PY800 in no time but on test reception is terrible. Spend much time checking tuner, valves, voltages etc. She says it might be aerial trouble. Send her away. Find v.h.f. aerial has not been plugged in to wall socket for some time. Lovely pictures on old set now that I have traced trouble.

**15.00** Nip out to attend to outside calls. First an Ekco colour set (Pye 691 chassis) with no picture. Short from PY500 to chassis. Partially slide out right side unit and remove side cover of line output transformer. Snip lead of  $0.47\mu\text{F}$  boost capacitor to prove it shorted, which it is. Could have been  $100\text{k}\Omega$  feed resistor to first anode controls damaged (down to zero) by shorted  $0.1\mu\text{F}$  decoupler, but not this time. Replace boost capacitor and reassemble side panel. Switch on but no h.t. supply. H.T. surge limiting resistor at top of panel open-circuit, with thermistor looking a bit dicky. Replace both. PY500 none the worse for wear. Grey scale not nice. Set up and wrap up job.

**15.30** Call to see set we had lately serviced, fitting new line output transformer and tube. Complaint, hum with a kinked picture – Bush Model TV161. Nasty hum, curved verticals. Check main electrolytic, earth tag (lower one with braiding) loose on rivet. Nip with wire cutters to improve contact instead of bashing with chisel (no chisel). No charge.

**15.45** Call at back-to-front house. Rear of house facing road, or rather drive. Open garage with four vehicles. Pick way through garage, Land Rover, Daimler, Cortina and something else to get to back door. Apparently front door never used. Ushered through to large lounge with french windows at end looking out at front of house over garden with large swimming pool looking green and inviting. Sliding doors at side of lounge open to second lounge where family is watching second colour set. Set to be attended is a large Dynatron in Queen Anne housing. Hope it has Pye 697 chassis (familiar), but having removed twenty thousand screws from rear cover find it to be almost new with 725 chassis (modified 731) which has vertical panels and of course is all solid state.

Trouble is wrong colours. Difficult to see exactly what's wrong since grey scale is a mile out. Turn down colour and set up first anode controls on dark background. Grey scale now good, but turning up colour produces only bright red and green. Talk to self. If grey scale is o.k., blue drive must be present at blue amplifier. Check voltages just the same. O.K. This probably means that the drive from the preceding TBA530 matrix i.c. is also o.k., but as it's a plug-in one and we happen to have a spare with us it's a matter of seconds to replace it. No change. This confirms our fear. Blue drive o.k., so trouble must be lack of B-Y somewhere around the demodulator/PAL switch i.c. TBA990Q. Sorry, we don't have one with us (having searched untidy tool box and found little plastic boxes with every other i.c. you can mention). Check effect of red, green and blue level controls. Red sets up red, green sets up green, blue adjusts brightness . . . No circuit with us, and memory rapidly deteriorating to blind panic.

Refit two thousand screws in rear cover whilst chorus from family demands father make tea whilst they watch horse racing. He makes tea as he is not interested in horse racing as he is a bookie. I tell him I will call again when I have learnt a little more about my job and have a TBA990 and have had a look at the circuit. He says don't worry because the picture looks quite nice and they have the other set and he is going out to his villa in Spain anyway and will ring me when they come back. Would I like a cup of tea? I say no, so we have a brandy each before I pick my way out the back of the house to the front and return to shop where several people are waiting to shout at me for not being there when I was wanted.

**17.00 Beginning to feel jaded. Check up on 725 circuit and come to conclusion that the TBA990 could well be at fault if only one or two other components can be proved o.k. Search through i.c.s but no sign of wanted one.**

Repair Fidelity radio with no a.m., removing dial drum to get at suspect BF194. Replace BF194 and reassemble set so that we can return it to its owner who happens to be the landlord of the pub we are going to visit that evening.

**17.30** Call it a day. Tidy up. Wash and brush up. Take dog for walk. Throw sticks for dog. Find sticks for dog. Deliver radio to pub at 18.30.

**22.00** Watch News at Ten and notice light areas toward top at each side of tube (new set), due to Teletext off top of screen being reflected back by bulb of tube on to screen. Decide to do something about it later. Go to bed and remember all the things that should have been done before effect of whisky in black coffee taken with supper and News at Ten have effect on top of beer taken earlier with landlord of pub causes drowsey or is it drowsy, or drowsie or something . . .

# A Visit to the Cinema

*Les Lawry-Johns*

WE had barely finished our lunch, which is a hit or miss affair at the best of times, and were about to have a quick game of draughts with the dog (I open the door, he closes it), when this young fellow rushed in.

"Les," he said. "Number three has packed up".

Now this may not mean very much to you, but it was rather depressing for me.

The young fellow was from the local cinema, and the local cinema (only one where there used to be four within spitting distance) is one of those jobs which have been converted to three – two down, one up. The projectionist lives in the top one, and when he wants to see his screen he looks straight out of his porthole and there it is. When he wants to see what is going on on the other two screens however, he turns round and looks at two television screens which should give him a fair picture of what is going on in the other two, provided the closed-circuit camera is pointing at the screen in the cinema and not at the courting couples on the seats at the rear.

The camera in each is coupled to a monitor TV set marked No. 2 for cinema 2 and No. 3 for cinema 3 (would you believe).

If one of these TV sets fails to perform, the projectionist has little idea about what is going on in that neck of the woods and the only way he can find out is by rushing down about two hundred stairs or phoning down to see if someone can have a quick peek.

You may ask why each section does not have its own projectionist? If they did, he or she would have nothing to do when all is going according to plan, as the whole thing is automated, the film being on one huge reel laying horizontal on a slowly revolving cakestand and operating on the same principle as a cartridge player except that the film has farther to go (to the projector and back). Markers operate the house lights for intervals, and shut the thing down and start it up at the required time, all without attention.

Until something goes wrong that is: and this is where the projectionist up in the main (manual) box needs to see and hear what is going on.

## **Monitor Modifications**

In this particular set up, the TV monitors are two 24in. Pye sets with modified 368 chassis. Modified is to put it mildly. The tuner and i.f. stages have been removed, and a small video preamplifier fitted to the side of the main panel which you will remember is of the swing-down type. A large mains transformer takes up much of the space on the left side, and supplies the h.t., at about 260V, and the heaters. These are still in series, run from a tapping on the transformer. In our opinion, which in the maker's opinion may be silly, the whole issue is overrun. The h.t. is too high, as is the heater current. The snag is that by the time the sets

need their first repair the poor old tube has reached the point where a reduction of heater current results in a very dim picture indeed.

In the past we had given No. 2 the full treatment, with a new tube, reduced h.t., a PY88 in place of the PY800 and a thermistor in the heater line. No. 3 had previously received attention but still retained the original h.t. and the original tube. It was this one which was out of action.

Having carried two heavy cases up some two thousand stairs (it's two hundred when someone else does it) we were naturally puffed when we reached the site, and this was the reason, or part of it, why we were depressed when we first received the call. It's one thing to repair a set, it's quite another to have to suffer on the way.

## **Operating Box or Projection Suite?**

Actually, it's quite interesting to visit these more up to date projection suites. We had considerable experience of them many years ago when they were called operating boxes and each projector had a large turntable at the rear of it on which a large record revolved slowly, the pick up working its way from the centre outwards to produce the sound which if the film had not been cut would synchronise with the picture (are you listening Chas E. Miller?) and which became disused when the sound track made its appearance on the side of the film in the form of a variable area or variable density strip which operated a photoelectric cell to produce superior sound (as time went on) and had the added advantage that if the film was cut the sound track went with it and so the sound stayed in sync with the picture...

## **The Defunct No. 3**

However, to get back to the defunct No. 3 TV. Investigation revealed a blown fuse, an open-circuit h.t. supply diode, and a cooked up surge limiter resistor. Checking the h.t. line showed no shorts, so we fitted a larger (in size and value, to slightly decrease the h.t.) surge limiter, making it 33 $\Omega$ , and a BY127, plus the fuse of course. We then switched on.

H.T. o.k., no heaters alight. Checking showed that the PL504 was open-circuit. This is the first heater in the circuit, being followed by the PY800 (PY88 in this case, which we fit here to reduce the heater current as it has a higher heater voltage rating). In view of the demise of the rectifier and surge limiter, not to mention the PL504 heater, we hurled the PY88 out as well, condemning it without a second thought as the cause of the trouble with a heater-cathode short.

Fitting new valves brought things to life, and the heater of the DY802 glowed up nicely. Now all this was done way

up on the shelf where the sets lived, standing on about two square inches of spare space on the rewind bench to save the trouble of lifting the thing down and lifting it back up again, and with the set turned 90 degrees to gain access to the rear. We thus had to stretch our neck to see what was taking place on the screen. The video input was plugged in but not the audio, so until we looked we didn't know what was taking place.

Now I didn't know that cinema 3 showed mainly sex films, so when I stretched on tip toe to see what the picture was like I was unprepared for what was there right in front of my nose.

Well, you could have knocked me off my perch with a feather. There was I, carefully brought up, looking at young naked females doing things I can't describe in this sort of magazine.

Frank, the projectionist, looked impassively at the screen and said "That's nice Les". I said I supposed so but did this sort of thing go on all the time? "Not that", he said, "I'm talking about the picture, it's good. As for what they're getting up to, that's nothing. You should see the one that's on with it. Proper gets on your nerves, all this bum and tit".

### Line Sync Lost

At that moment the picture moved sideways and lost line sync. "It didn't last long, did it", Frank said gloomily. Hanging on with one hand, I reached down to my box with the other and clutched a PCL805. A what?!

Well, with this chassis there are two ECC82 valves as the line and field oscillators, the PCL805 functioning as the field output (pentode) and the flywheel line sync phase splitter (triode). Thus when the line won't lock but drifts back and forth with the hold control, the PCL805 is the first suspect. With the new one in the line locked solid and we were back to the bare facts of life and those naughty girls.

### Final Checks

Before wrapping the job up, and while still up on our perch, we checked the audio input and the condition of the PCL82. This and its cathode resistor do not appear to have a normal life span, but we had replaced them not so long since and they seemed to be holding up well enough.

We thankfully replaced the rear cover and turned the set so that Frank could see that the carryings on in cinema 3 were up to the normal high standard. We then packed our gear and plodded down the ten thousand stairs, carefully avoiding cinema 3 on the way out. Outside, the advertising broadsheet read: "See the love life of the most beautiful girls in Europe". Oh dear, and not a male in sight. Are we really necessary, apart from repairing sets that is?

### There are Other Monitors

One must not run away with the idea that all cinema TV monitors are the same. Oh no. Only a few weeks ago we had one sent in from another town. This was an all metal job, made by Sony. This used valves but the heaters were in parallel, EY88 etc. . . . All good fun, but we haven't plucked up enough courage to tackle the cameras. Any volunteers?

### Footnote . . .

We understand that cinema projectionists are in very short supply. A short training period and you could be watching three films at once while being paid for it.

# next month in Television

## ● SERVICING THE RANK A823 CHASSIS

The Rank A823 chassis, released in 1969, was one of the earliest all solid-state colour chassis yet along with its later variants it remained the basis of the Bush and Murphy ranges for the following seven years. There are consequently many tens of thousands of them about. The start of a detailed report on the servicing aspects.

## ● AUTOMATIC TV SWITCH OFF

A simple circuit which automatically switches the TV set off when the light is extinguished. Ideal for those who watch the midnight movie in bed!

## ● EHT TRIPLERS

There's more to triplers than meets the eye — and this part of the TV circuit has received less attention than it merits. In addition to providing the EHT, the modern tripler provides the c.r.t. first anode supply, the focus potential and, in many sets, is closely associated with the beam limiter arrangement. Basic operation, associated circuitry — and what goes wrong. By Harold Peters.

## ● ADJACENT CHANNEL TV RECEPTION

Those wishing to receive a weak signal on a channel adjacent to a strong local signal will have their receiving installation tested to the limit! There are ways of considerably improving the signal however, by adding suitable filters. Hugh Cocks reports.

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# Toil and Trouble...

*Les Lawry-Johns*

I MUST admit that I am never at my best first thing in the morning. The world then seems to me to be conspiring to cheat me out of my cup of tea and piece of toast, and when the world beats a path to my door before the humours have settled it's greeted with snarls and grunts. After say 9.30 (a.m.) a transformation takes place and I am once again the obliging, polite, helpful fellow that most know well (so they think). In short, before 9.30 I see the world as it is. After 9.30 I see it through rosy coloured glasses and I can then face almost anything. Almost, but there are limits.

## *Then, puff, it stopped speaking*

Take the other morning. Just after nine, as I was busy thrashing the dog for fun, in walked a couple of gentlemen carrying a Bush TV161. Their command of English was not good.

"There is nothing wrong with the television you know", said beardy. "It will take you only a few minutes to put it right."

Non-beardy was equally helpful. "I think it is perhaps a fuse, as it was perfectly all right you understand and then, puff, it stopped speaking." I struggled for a few moments and then managed "Ah yes, there is a lot of it about you know".

Bardey was not distracted. "How much will it cost to replace this fuse?" I thought for a moment. There was an axe under the counter, or I could accidentally let off the fire extinguisher. "Perhaps we had better find out why the fuse failed?" I suggested, having considered the mess that would be caused by either of the above two alternatives. "Would you like to come back later when I have found the reason?"

Non-beardy was stubborn. If it was a fuse, he wanted to see it fitted with no hanky panky. Quick as a flash, my lightning sharp mind added up the possibility of a bit of fun. If the fuse had popped it was probably the mains filter capacitor, a shorted rectifier diode, or perhaps a shorted boost capacitor (returned to chassis in this model). Why not let them see that fuses do not just blow by themselves (except in some makes of colour sets, but that's neither here nor there)? Why not, why not?

In a trice the set was on the bench and the back was off. Beardy's head peered in at one side while non-beardy's head peered in at the other. I removed the shattered fuse from the lower right side. So that I would not get caught in any atomic fall out, I quickly checked with the ohmmeter: mains filter capacitor seemed o.k., but you never know with these, the rectifier diodes were not short-circuit, no h.t. shorts, and  $1M\Omega$  from the top cap of the PY88 boost diode to chassis (boost capacitor not shorted). So that it would not fail too easily I put in a 2.5A fuse, plugged the set in and switched on.

Valves started to heat up nicely. Beardy beamed. "The fuse does not fail!" Feeling slightly bemused, I switched the meter to the 300V range and went to check the voltage at the main smoothers on the lower left side. At that moment there was a loud hiss and a jet of vapour shot out of the main smoothing can and hit me dead amidships (clean shirt

that morning no longer clean). Pop went the fuse and the two enthralled spectators vanished for a moment.

Bardey reappeared. "What did you do to our television set to make it go bang like this?" he demanded. "What did I do?" I screamed. "Look what your bloody set's done to my shirt." Non-beardy howled with laughter. "Do it again please, just once more." I scowled at him, slackened off the clamp holding the electrolytic, snipped off the tags and pulled it out, holding it with a pair of pliers. "Here it is, it's all yours."

Non-beardy took it and dropped it in one go. It was beardy's turn to laugh. "Hot, you know", he confided in me.

"Right", I said. "Now let's get down to it. If you want it done, say so." Anyway, after this it all passed off without further incident and away they went carrying their Bush which now spoke instead of hissed. I removed my shirt to ensure that I had not been permanently injured. "Look", I said to the chief squaw. She wasn't very sympathetic. "I wish I'd have seen it" she giggled. Resplendent in another clean shirt (we've got two, one now a different colour around the navel), we tackled the next job.

## *Dud rectifiers*

This was a Philips G17T320. Many of these are now coming in with a shattered mains input fuse. This tends to direct attention to the mains filter capacitor which has not however been found at fault so far. Instead the fault has in each case been the bridge rectifier, which shorts from the negative end to the a.c. input. The power panel is secured by two screws and is easily removed without loss of the screws or the insulated stand off spacers — well done Philips. With the panel turned, the bridge can be removed quite easily. Note that the replacement should be a BY179. Check the voltage rating of any other type you use and also which end is positive and which is negative. Otherwise fit four BY127 or equivalents. Incidentally, the mains input filter capacitor is clipped to the side wall near this panel and is not near the on/off switch. Since we dealt with this series of receivers in the December 1976 and January 1977 issues we will not add servicing notes here.

## *Liquid problems*

Just as we were wrapping up the Philips, a grey Renault 16 drew up outside, gleaming in the sun. Out hopped Derek, who is a river pilot and a regular customer. He looked decidedly wet on this dry, sunny day.

"Hallo Derek", we greeted him. "Did they make you walk the plank?"

"No" said Derek. "I've just come from the car wash."

"Wouldn't it have been better to take the car in with you?" we asked reasonably.

"Very funny" said Derek savagely. "I was in the car all right but the bloody fool I lent it to over the weekend hadn't shut the sunshine roof properly. Anyway, that heap of rubbish that I bought from you some time ago has gone

wrong. Can I bring it in when I've been home and dried out?"

Assuring him of our utmost co-operation, we watched him climb back into his car and drive off, little knowing that he was to be baptised yet again later that evening when a pint of beer placed on a high shelf would be accidentally knocked off smack on to poor Derek's head just as he stood back from the shove ha'penny board to admire his winning effort. Gusts of laughter filled Harold's bar, and some wit shouted "Consider yourself launched, God bless you and all who sail in you". This has little to do with the day's work, however: just thought you might like to know about it.

### A nasty surprise

We then turned our attention to an ITT colour set which we had taken to be a CVC8 or something of that ilk. When we removed the rear cover however a cold hand clutched our heart. Not a valve in sight! The moment of truth was at hand. Our first CVC20.

"Help!", I yelled to the chief squaw. "Bring some strong coffee and blow the expense." The chief squaw appeared as though by magic, carrying the required tranquiliser. "What are you carrying on about now?", she asked sympathetically.

"It's this, this set. We haven't had one in before and I haven't done my homework and I'm frightened."

"Never mind, you'll sort it out. Do you think my hair looks all right this way or should I do it like I normally do?"

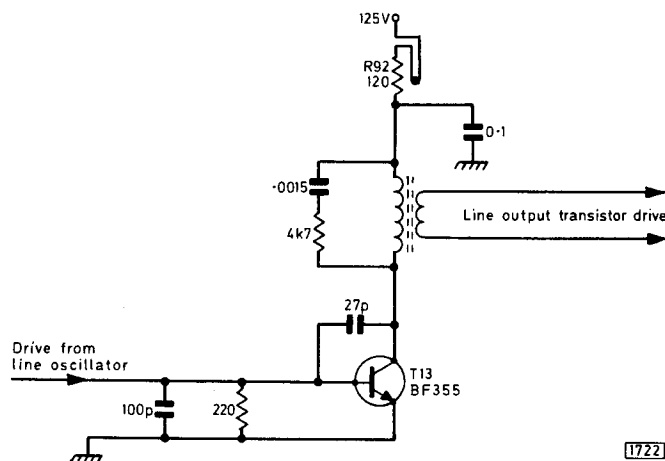
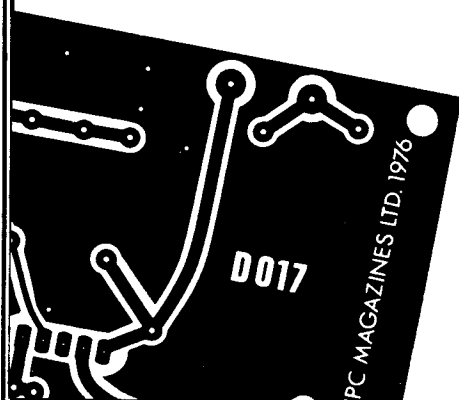
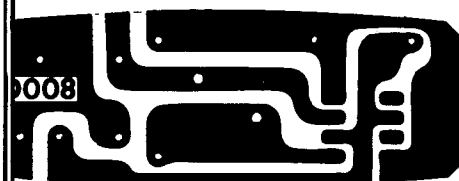
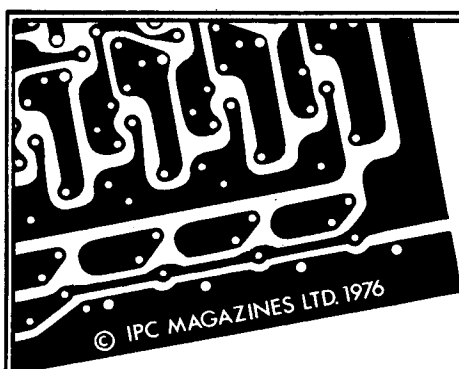


Fig. 1: Line driver stage, ITT CVC20 chassis.

This was it then. Alone and friendless. What about these women though? If they cared half as much about the inside of their heads as they do about the outside they'd all be rated as geniuses. Still they're not so bad really. Some are really quite useful. Back to the CVC20 however.

E. Trundle did a nice write up on the switch-mode power supply used in this receiver in the September issue, and readers not familiar with the circuit could well profit from a study of this.

The set we had on the bench had no e.h.t., although the



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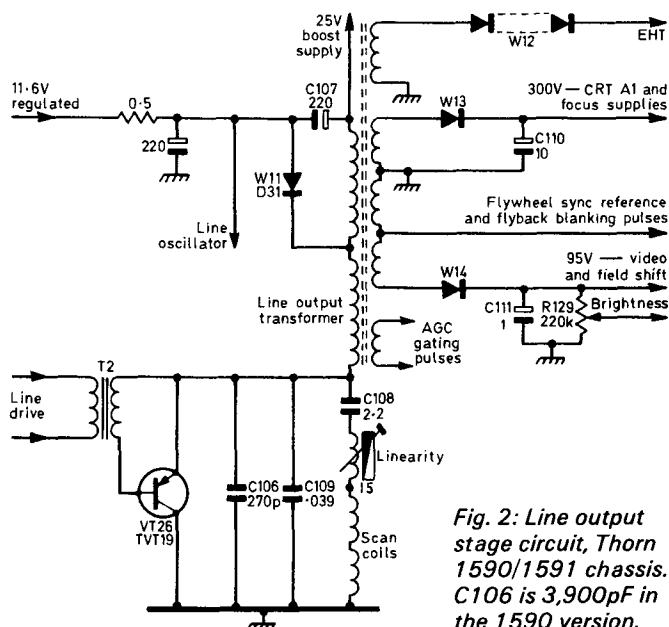


Fig. 2: Line output stage circuit, Thorn 1590/1591 chassis. C106 is 3,900pF in the 1590 version.

supply was present to the line driver and output transistors and there was a continuous note coming from the loudspeaker. This suggested that either the line oscillator was not functioning or the line driver transistor (see Fig. 1) was at fault. Its collector feed resistor R92 was not open-circuit so we took the easy path and noted that there was no voltage drop across it. Cold testing the driver base-to-emitter and base-to-collector did not at first show the correct readings, but then did so on the second attempt. Switching on again produced full e.h.t., full sound and full colour....

Having been fooled by transistors in the past (cold testing often seems to bring them back to conduction), we immediately accused the driver transistor T13 (BF355), of being the culprit and whipped it out before it could say a word. We didn't have a BF355 to hand, so we used our favourite transistor of this type (high-voltage, medium-power npn), which is the BF337, and were rewarded by good results and have had no comeback so far.

## No EHT again

The feeling of relief encouraged us to tackle the next job, which we thought was going to be an easy one, without delay. It was an Ultra Model 6816, which uses the 1590 Thorn chassis. The note said "very narrow and dark picture".

With the set on the bench there was no picture or raster at all, with not very much activity around the line output transformer. The supply line was correct at around 11.5V however. Checking for shorts around the rectifier diodes W13 and W14 (see Fig. 2) produced no fruitful results.

With these symptoms either one of those diodes or its smoothing electrolytic (C110 for W13, C111 for W14) is usually found to be at fault. Checking the boost diode W11 and capacitor C107 again produced little cheer. Disconnecting the scan coil coupling capacitor C108 merely produced a faint vertical line down the centre to show that the woeful loss of line output efficiency was still present. The AU113 line output transistor next received the best check of all — replacement — but the fault still persisted.

As the line oscillator was obviously working we were beginning to think in terms of a faulty line output transformer. There were other possibilities still to check however. Disconnecting the e.h.t. rectifier stick W12 produced no

better response. We then did what we should have done in the first place and checked the waveform at the base of the AU113. This was quite weird looking. Thus armed we attacked the driver VT25. This is a TIS90 and although it read reasonably on a cold test a replacement restored normal working.

Two drivers in a row! Decidedly back seat types. Still suspicious, we left the set on test but it behaved itself, thus proving that the drivers of today are not what they used to be.

## Arcing, and a smell

The next item on the agenda was a large Ultra set fitted with the Thorn 3500 chassis. Arcing noise they said, and a smell. Easy we thought: the tripler. Removing the tripler lead to the e.h.t. transformer should restore normal timebase working and the correct voltage drop across the 1.5Ω monitoring resistor R907 on the beam limiter board. The voltage drop remained at over 3V however instead of 1.3V, and to prove the point the spring cut out sprung. At this the weak BBC-1 sound became loud ITV as the voltages went up with the load going down.

Making a few tests around the line timebase turned out to be fruitless (no the driver wasn't guilty, neither was the line output transistor). Capacitors were checked and all shouted their innocence. Still the suspicion lingered ... arcing and smell. Brave to the last we unhooked the e.h.t. transformer and reconnected R907. It ran cool. Lunchtime.

During lunch a lady rang to say that the wood veneer on the front of her new TV set was buckled and could we let her have another set today as her grandchildren were coming at five o'clock and if they saw the buckle sticking out they would pull it off altogether. We complied with her request and only wish that we could get such prompt attention from the people who supplied us with the set. No such luck, it is still here and is likely to be for some time unless we get a carpenter on the job ourselves. Never mind, it's our problem.

Back to the 3500. We obtained and fitted a new e.h.t. transformer and were then in a quandary. Whether to connect the tripler and see, or to fit another one thus putting up the charge considerably. We decided to approach with caution. With the set on, we advanced the tripler lead towards the nipple of the transformer. The spark was not nice, it was more of a flame. We feared for the new transformer and some of the more responsive transistors. On fitting a new tripler all was well and the only difficult thing left was to write out the bill.

## Hari Kari or Marta Hari?

We will not bore you with a description of the rest of the afternoon's activities except to say that they consisted of attending to intermittent faults on stereo units. These nearly caused us to commit Hari Kari (or is it Marta Hari, where you plunge a knife deep into a block of cheese).

## Problems with a 1500

It was getting near closing time when an HMV mono set (1500 chassis) came in (all on its own, it just walked in) followed by its owner who had trained it well. He had just acquired it. Would we give it the once over?

Switching on produced a plain raster with no sound. This normally leads one to the i.f. transistors or the a.g.c. circuit of course. The a.g.c. amplifier transistor is VT3, which controls the second i.f. amplifier transistor VT5 which in

turn controls the base of the first i.f. amplifier transistor VT4 (no tuner a.g.c.). Checking voltages showed some funny readings of around 20V on the legs of VT4 and VT5, i.e. both saturated, and incorrect voltage at the base of VT3. VT3 is driven by the a.g.c. detector diode, which is fed from the slider of the preset contrast control in the emitter circuit of the first video transistor VT8. So we went on to VT8, where there was nothing at the emitter and very little at the base. The base bias is filtered by R30/C32 (see Fig. 1, page 40), and checking back we found nothing at the junction of R79/R136. R79 is the left-hand section of the dropper, and should have a value of 317Ω. It was open-circuit, leaving a high voltage at the input to the transistor supply line smoothing resistor R78. Fitting a replacement wirewound resistor restored normal voltages, but still no signals except for some short-wave noise creeping through the sound i.f. Checking through revealed that the fourth i.f. amplifier transistor VT7 was faulty. Replacing it restored sound and vision signals (this transistor often fails when the transistor

supply line rises excessively after R79 goes open-circuit), but...

There was a nasty hum bar drifting up the screen, with the picture pulling and rolling. Check transistor supply line electrolytics. C58 proved to be faulty, not surviving the effect of R79 going open-circuit.

Replacing C58 restored near normal conditions, but on adjustment the local/distant tuner gain control R74 fell apart. A new one put us on the road again except for occasional picture roll, which as usual was cured by replacing R44, the upper resistor in the potential divider network feeding the screen grid of the 30FL2 sync separator.

All now seemed well except for an unpleasant smell which however proved not to be issuing from the e.h.t. tray but from the sewerage works across the river. The owner lacked transport, having come in a taxi. Would we phone for a cab? No taxi available at this time of the evening. Wait fifteen minutes. Then run him home, and his set. Reached the pub just in time to see Derek annointed.

## Which Valves to Stock?

*Peter Duncan*

WITH valves no longer being used in current production TV receivers it is becoming increasingly important to decide what to keep in stock. The problems are roughly: which valves are worth laying in for future repairs, which ones aren't worth re-ordering, and which ones will probably never be used and should be stored out of the way?

The last two UK setmakers to produce hybrid colour chassis were Decca and ITT. The valves used in their final hybrid chassis are as follows: PCF802, PL509, PY500A, PCL86, PCL82, PCL805, PL508, PCF80. A set of these costs around £7.68 (based on the prices quoted by Bentley Acoustics in their August 1977 advertisement) and this represents the minimum stock required to be able to offer an efficient colour repair service. It seems to us that the future of any valve as a profitable spare is in some doubt if it's not one of these.

With the exception of Thorn, all UK setmakers started off by producing hybrid colour receivers. The additional valves required in order to be able to cater for these earlier colour chassis are as follows: PL504, ECC82, EF184, EF183, EF80, DY86/87, PCF805, PC97, PCL84, PL802, PFL200, GY501, PCF200, ECC81, PCC85, PCC88, EY51, PD500, EB91. Some of these are to be found in only the earlier, dual-standard chassis. The important ones are the PCL84, PL802 and ECC82. The Philips G6 chassis is still regularly encountered however and had a rather unusual valve line up. To be able to deal with these sets you'll need to have the following in stock: EF183, EF184, EF80, PFL200, PCC85, PCF200, ECC81, EY51, GY501 and PD500 – in addition to some of those listed in the second paragraph.

Service enthusiasts who worry when they cannot do an immediate repair to an old set requiring a replacement valve not in stock should relax: the RETRA code of practice allows up to fifteen working days for a repair, and valves can be obtained by return post from advertisers in *Television*. When ordering a valve specially for an old set it's wise to order a couple since new valves can unfortunately also be faulty. The cost of repairs carried out on old sets should

allow for the fact that you may be left with valves that are unlikely to be used.

There is a belief that foreign sets are constructed with infinite care to stringent, all-transistor quality specifications and are thus absolutely reliable. Not so! Foreign sets do fail, and when you take the back off you may be surprised to find a host of good old unreliable valves. Depending on which makes you may handle, the following is a list of some of the valves you may require – we're not repeating the types so far listed.

*Bang and Olufsen*: 12HG7, PL84, EAA91 (an EB91 will do however), ECL84, PY88.

*Telefunken*: ECH84, PL519.

*Saba*: PL519, PL95, PC92.

*Sanyo*: 3BS2A.

*Kuba Porta-Colour (also known as the Granada Colourette)*: PC900, PY83, 1AD2.

*Teleon*: 3AT2, 6GH8A, 8FQ7, 10GK6, 17DW4A, 17JZ8A, 21LU8, 31JS6A, 40KD6.

The odd balls are mainly in early Japanese sets, due to the American influence. Note that the PL519 is an up-rated version of the PL509 and may be stocked in its place. Unless specialising in the repair of foreign sets it's best to regard these valves as "special order" types and quote five-fifteen days for repairs.

When it comes to monochrome sets the situation is more difficult, due to the greater variety of valves that have been used in them. To appreciate this it's only necessary to think of the Thorn 1400 and 1500 chassis which used such valves as the 6F28 and 30FL2. Stocking up to be able to deal with an extensive range of monochrome sets can be expensive, though many of the valves used will already be in stock for use in colour sets. The following are the main valves required, in addition to those listed in paragraphs two and three, to be able to deal with most of the valved and hybrid monochrome sets produced since 1970: PY88, PY801, DY802, PL36, PL81A, 6F28, 30FL2, 30FL14, 30PL1, 30PL14, ECL80 and, if you deal with Grundig sets, the PL95 and PCH200. ■



# *It won't take you a minute . . .*

*Les Lawry-Johns*

THERE are days when everything goes with a swing: there are others when you are on a roundabout which keeps bringing you back to where you started from. Not only do you get nowhere, but the damned thing starts going backwards and you end up hate filled, bitter and frustrated. Much like that ladybird I was watching the other day walking round and round the top of an empty bowl, not realising that it kept coming back to where it started. But then ladybirds can fly off and escape from that type of torture. For me there was no escape when that Hitachi monochrome portable arrived for its three day stay which I thought was going to be a couple of hours at the outside. You could call it a mother-in-law, and it behaved in much the same way.

## *A Good Start*

It (the day) had started off quite well really: three colour sets polished off in minutes each. The first, an Ultra with a 3500 chassis, simply needed a red button cut-out because it had cut out and wouldn't come back. Twist, twist (the tabs), unsolder two leads, plonk the new one in and that was that.

The second was a Decca with the Bradford chassis. Poor focus, width o.k., check the resistors associated with the focus unit (two  $4.7M\Omega$  resistors, one from the tripler to the focus unit, the other from the unit to chassis) and find one high. Snip snip and Bob's your auntie.

The third was an ITT CVC5 with no sound (PCL86) and an initially rolling picture (PCL805). It doesn't happen very often like that but there they were, three in a row and I was smiling. Then in walked Stan.

## *The Hitachi Portable Arrives*

"Just have a look at this portable will you, you did it a couple of years ago and it took only a few minutes, probably the same thing again. I'm going to have a haircut – collect it on the way back". Before I could think of a cutting remark he had gone, leaving his Hitachi P32 monochrome portable for me to wave my magic wand over.

Although there were several other things to be attended to I thought I'd try to oblige. Screw either side and two underneath, pull off the side contrast and brightness knobs and lift off the cabinet shell. Plug in aerial and switch on. Still tuned in as sound came on full strength, but no picture. E.H.T. o.k. Tube base voltages: first anode pin 7 o.k., grid pin 5 near enough right, cathode pin 2 high at 100V (should be about 54V).

Well that looks easy enough: video output transistor not drawing any current. Where is it? There, with a heatsink on it: check collector, 100V; base 2.5V; emitter 2V. Switch off and cold check the transistor. Reads right and as the base should be at 4.2V check back through the contrast control to the emitter of the video emitter-follower. Voltage low here too, and the base low at about 2V (should be 4.95V). Where

does it get its bias from? Check bias network, having removed the screening covers (soldered on in several places) to get at the print. These and other components seemed to be blameless.

Some time had gone by and back came Stan. "Done it?" he enquired cheerfully. "No", I growled. "If you think it's that easy, do the bloody thing yourself".

## *Only the Sound's Slipped Out*

"Don't be like that", said Stan. "It's only that the sound slipped out".

"Slipped out, slipped out", I croaked. "I suppose the picture slips in when the sound slips out?"

"Yes, that's right. The knob's probably loose", said Stan helpfully. This was too much for me. Putting the set back upright, I asked him to give me a demonstration. He turned the tuner knob slightly and the sound slipped out and some sort of picture slipped in. I clutched at a straw.

"You haven't just come back from a wine tasting trip to Germany have you, and had this thing seen to out there?"

Stan looked at me as if I'd gone loony.

"I don't drink wine if that's anything to go by, and I haven't been to Germany or Timbuktu, and if I had I wouldn't have taken this with me, so what are you on about".

"Never mind, I only thought . . . Oh well", I floundered.

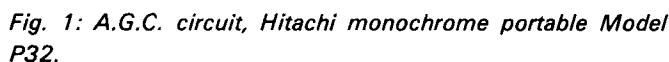
I returned to the tuner. Tuned in correctly, there was no illumination on the screen at all. Detuned, the screen lit up and the sound naturally slid off. The possibilities were endless and my mind went numb. "Better leave it with me Stan, there's nothing easy about this one".

Stan departed, mystified that such a small thing could take so long to put right. He said he'd call in when he finished work on Monday evening, leaving us the weekend. When he had gone there were several other sets to see to before we could get back to the mystery. When we did get back to it however we didn't get very far.

## *The AGC Circuit*

It was now obvious that when a full-strength signal was tuned in there was insufficient output from the detector to drive the video emitter-follower. Without an aerial at all, the set behaved itself and a grainy picture could be tuned in with almost normal sound. This naturally directed attention to the a.g.c. line, which was checked through bit by bit as the circuit (see Fig. 1) is not all that easy to follow from the manual. The two transistors appeared to be in order on a cold test, the capacitors had capacity, and the resistors were right. With the set on again, everything was in order! Therefore all the testing had been in vain, since the fault was not present. After some time however the picture started fluttering and back we were to square one. After some more fruitless checking we put it down until the next day.





Many hours had been spent tracing this simple fault but there had been several interruptions to distract us. When Stan returned his comment was "I knew it wouldn't be very much. Fancy it taking you all that time to do it". Our reply was unprintable.

There are several possible trouble spots with this unit, as we have mentioned before in previous issues. We always go straight to the components on the print, which are soldered on both sides. Lifting the small capacitors a fraction with the solder melted ensures that the legs get the solder and not the cement. This is normally all that is required, and once again this seemed so as a normal picture appeared when the unit was replaced. After twenty minutes however the same symptoms returned and the whole process had to be repeated, this time with lasting success.

Then followed a long, involved tussle with a Rigonda Starlet 603. We do not normally handle these, but this set belonged to a close relative so with bad grace we got down to it. The complaint was that it would function for a time and then intermittently go off as though switched off.

If it comes back I'll fit an AD149 and see if that cures the condition, but so far everyone appears to be happy.

**Tel: 0752 813245**

# ***The Bermuda Triangle***

## *Les Lawry-Johns*

MOST people have heard of this mysterious tract of the western Atlantic, where things and people disappear without a trace. It seems that they are either sucked down or sucked up into another world. In any event, they're never seen again in this one. Wouldn't it be handy if we had easy access to this vortex, where we could dump certain things which cause us so much heartache? Wouldn't it be nice if we could dump certain people there who. . . . What's this all about you may ask?

Well, it's about several things really. Take the name Bermuda to start with. Ultra used it years ago when they were Ultra and not Thorn. Then a Bermuda was a monochrome TV set in a slim light wood cabinet with a gold surround with or without motorised tuning. In other words, you knew what it was and give and take a little what you could expect. The fact that there might have been a Bermuda radiogram was of little moment.

Now however a Bermuda can mean anything from five or six different colour models, say ten different monochrome sets, to a bar of chocolate. You may rightly say that the name was never meant to be anything other than a brand identification, and that there is a model number. Of course, of course. But you try telling that to the dear old lady who says that the picture has gone off her wireless and that she only watches the home service.

"Hallo, I want you to come and look at my wireless. The picture has just gone off."

"Yes, so has everyone else's, there's a power cut on. Your light has gone out as well, hasn't it?"

"No it hasn't. It's not as bright as it used to be and the man downstairs says it's the battery, but I don't believe him because it has been perfectly all right for months."

"No dear, we don't mean your torch, we mean the electric light, the one with the switch on the wall."

"I don't use that when I'm watching the wireless."

So you see, it's difficult to find out what it is you are supposed to go and service, even when there isn't a power cut on.

### *A Brilliant Band of Colour*

Not that this was the case when Mr. J phoned to say that his Ultra colour set was doing funny things. We knew only too well which model it was since we'd sold it to him only a few days earlier. His description was alarming. After the set has been on for say two hours, there is an occasional brilliant band of colour across the screen, of such short duration that it's difficult to describe. Arriving on the scene hotfoot, with another new Ultra lurking in the back of the van, we studied the displayed picture for some time before the condition showed.

A brilliant blob of primary red with a slightly offset pure blue shot across about half way down the screen, with the picture still visible above and perhaps below although it was difficult to say for sure.

"There you are," said Mrs. J. "I told you it was red and green."

"I only saw red and blue," said Mr. J.

When it happened again, I too saw a green area. I also saw complications. To me this was a tube fault which would probably clear itself if left on long enough, but we had

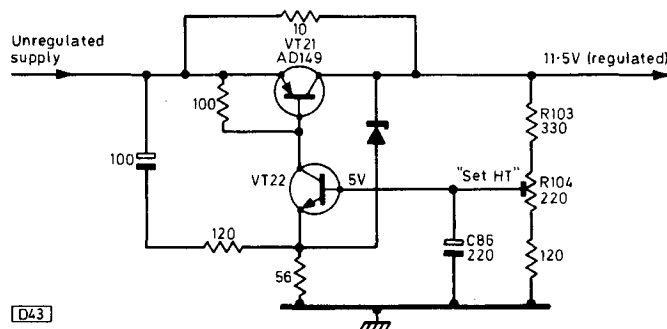
already registered the tube in the customer's name for the four year warranty and he didn't want his set doing funny things for any length of time. So we collected it and left the other new one.

To confirm our suspicions, we rang Thorn. After a time a nice young man with a slightly bored voice (who blames him, talking to confused engineers all day long) said that they'd had this trouble with new 9000 models (our's was an 8800) and that the new tube was having a short lived freak out (our expression, as we are not very technical) and that this was sending a spiky waveform back to the decoder which responded by creating the condition described. He said it would not occur with the colour off therefore. If we were worried, remove C194 ( $1\mu\text{F}$ , IC5 pin 5 to IC4 pin 11 – PAL switch drive coupling capacitor) from the decoder panel and fit a  $12\text{k}\Omega$  resistor in its place. If that didn't do it, replace IC4 (reference oscillator i.c.) or IC5 (demodulator/matrix/PAL switch i.c.). Thank you we said, in a subdued voice, and hung up. We're still waiting for the effect to recur so that we can put in a  $12\text{k}\Omega$  resistor and know whether the trouble has cleared, but it won't happen for us as yet. We'll report our findings later.

### ***Varying Size Picture***

This then was one point of our Bermuda triangle. The next was a 14in. Ultra portable with the Thorn 1591 chassis. The complaint was that the picture would decrease in size, going darker at the same time and with the sound reducing in sympathy. Obviously the supply line was falling to a low point and then recovering, only to fall again. This could be due to several causes, so we first checked at the body (collector) of the AD149 regulator transistor where we found that as expected the voltage was rising to the normal 11.5V and then slipping quickly down, to about 8V, then recovering in a fluttery sort of way. On test the AD149 proclaimed its innocence, as did the 10 $\Omega$  wire wound resistor in parallel with it. We then moved down to VT22 (see Fig. 1) which samples the 11.5V supply line and reports its findings to the regulator transistor which should respond accordingly.

VT22 should have 5V at its base when the supply line is 11.5V, and this 5V is initially set up by the preset control R104. The transistor and its associated components seemed to be in order when checked with the ohmmeter, so we switched on again and checked for the 5V at the VT22 base. The 5V was anything but 5V (but didn't exceed it). The



**Fig. 1: L.T. regulator circuit, Thorn 1590/1591 chassis.**

At his point we noticed that the panel surface in this area did not present its normal appearance. It was slightly darker. We investigated with a finger and carefully examined said finger. It appeared to be oily. With ruthless efficiency, we cleaned off whatever it was. Some devilish fluid straight from the triangle no doubt. Wherever it had come from (no leakage from electrolytics), once it had gone the voltage remained stable.

The third Bermuda came by way of Derek who seems to have acquired the knack of getting himself involved in the most embarrassing situations without even trying. You may remember our account in the November issue where he got himself washed in a car wash and subsequently doused by a pint of bitter in Harold's (never a dull moment) bar. His latest escapade was the result of trying to do a good turn for his friend Derry. It appears that Derry had had a late night out in London and had caught the last train back, more by luck than management. However, his luck didn't hold out because as soon as he got aboard he fell asleep and didn't wake up until the train arrived at its final destination, having stopped at every station down the line including the one where Derry should have parted company with it.

"I'm acoming for you son," said Derek sleepily. So saying he tumbled out of bed and put on his slippers. Still clad in his pyjamas and without so much as a dressing gown, he started up the mighty engine of his Renault and thundered off down the motorway towards the stranded Derry who by now was again sound asleep in the railway waiting room.

Beating a hasty retreat back up the motorway, they were some ten miles from home when the car broke down. Many things were tried that night, things which would cause ordinary men to turn pale. But it was of no avail, the car would not start.

I heard all this when Derek was again helpful when his neighbour's set broke down and he struggled in with it.

"Thanks," I said, putting down the reader's query which had been puzzling me for the last half hour before closing time.

Taking the back off and switching the set on produced no rustle up of e.h.t. Checking on the beam limiter board, where all good boys start, showed about 60V at one end of



**R907 (1.5Ω to chassis, where the voltage should be 1.3V). Did it just die, or was it killed?**

"You've got a picture," said Derek.

"Is it supposed to be in colour?"

"Oh, I supposed they've been twiddling the knobs," I desperately hoped.

They hadn't. All the twiddling in the world wouldn't produce the slightest vestige of the required variation of the screen's triads. With sinking heart we swung up the convergence board to expose the decoder panel. What's this then? A replacement chroma delay line, apparently fitted in haste or in desperation.

As I was checking this area, Derek volunteered the information that the previous repairer had had any amount of trouble with the colour or absence of it, had carried out a lot of work to the detriment of both his health and happiness, but had finally succeeded and had then retreated to his doctor, sitting in the waiting room staring vacantly into the distance.

It appeared then that disturbing the set had disturbed something on the decoder board. Turning the set on its side to expose the under side of the decoder board, we chased up a few blind alleys before finally arriving at the delay line driver VT310 where we should have started. No voltage anywhere. Investigation showed R389 (see Fig. 2) to be open-circuit and discoloured. Replacing this  $220\Omega$  resistor brought back colour (albeit wrong), and as we could find no reason for the failure we concluded that the original delay line had had an intermittent short in it which had caused the colour to fail and had driven the other poor fellow up the pole before he found out what was wrong and replaced it. Unfortunately, he had not checked the effect of this on the supply resistor and had not questioned his luck further once the new delay line had resulted in glorious colour.

Lowering the set down to its proper level brought back natural colour. Raising it  $45^\circ$  caused the faces to turn a funny colour (not really green). We again checked around but could find no loose cores or the like, and once again we had to conclude something. We concluded that the c.r.t.'s shadowmask was loose and took up its correct position when the set was likewise. So there!

# 'Twas on a Monday Morning...

Les Lawry-Johns

I WAS busy wondering what to do when this policeman came in. "It wasn't me" I maintained stoutly, remembering my breaking and entering days.

"I've been told you repair things" he said pleasantly.

"If you'd like to bring it in we'll do our best" we assured him.

"I have it with me" he said, taking off his helmet.

Now we've been asked to service many things in our time, but never before a policeman's helmet.

"What's gone wrong with it?" we asked, expecting it to contain a transistor transceiver or some James Bond gadget.

"The top loop's O.K. but the bottom one has broken away from the badge so that the matchstick won't hold it steady."

Lots of people wonder what a Scotsman wears under his kilt. If they want to know, all they have to do is catch a train from King's Cross (if they live in the south) to Edinburgh Waverly station and stand at a windy corner and they'll soon find out. If you've wondered about policemen's helmets however I'm now in a position to tell you. They contain matchsticks. Not whole ones mind you, but short pieces to go through the small loops to keep the silver top motif in position.

With the badge on the bench it could be clearly seen that the lower fixing had broken away and it was a matter of fixing the peg back on in the right position so that it would enter the hole at the front at the same time as the upper one (which went downwards) entered the top one. But the angle needed to be right.

Surprisingly enough, the badge was chrome on copper as was the peg, so soldering was no problem, only the angle. It took two attempts to achieve a correct fitting, but we did it and on it went and in went the matchsticks to keep it in position.

## *An Electronics Wizard with a Thorn 8000*

That was the first job of the day, the rest will perhaps be of more interest as they concern television sets (what's the name of this magazine?). A Thorn 8000 was the first one to hit our bench: the owner was an electronics wizard and in no time at all he'd whipped out the circuit diagram and spread it on the bench. "Here's the trouble", he stated. "The line oscillator is not functioning. That's why there's no picture. I've checked this, this, this and this, the voltages are wrong here, there, and here. It's probably something simple but I can't put my finger on it."

I gazed at him in open-mouthed admiration. "You mean, you've done all that and it still doesn't work?"

"No", he explained. "It wants a 'scope on it and mine at work is too big to cart home. Can you put one on it?" "Can't afford one", I confessed. "I did have one once but it only made a lot of squiggles that I couldn't understand so I gave it up and I've felt much better since".

He looked at me suspiciously. "I suppose you can't read that Avo either". I said that I could read the Avo when I

took my glasses off but the trouble was the needle stuck about a third of the way up the scale so even here there wasn't much to write home about from a servicing point of view.

He smiled at his wife who waited patiently during this exchange. "I can see we're in good hands here dear, let's go and get the shopping done and we'll call back later to see how our friend has got on".

## *Dropper Troubles*

Before they went he mentioned that the lower end of the dropper consisted of two sections of five and six ohms, and that the six ohm section had failed some time ago so that the surge limiter was now only five ohms instead of eleven. Would I do that as well while I was about it?

So off they went, leaving me to ponder upon what my mum had told me years ago. Never decrease the value of a dropper she had said. So I thought I'd have a look at this first. It was one of the vertical ones with several tappings rather than the later horizontal fat one with a few. Idly putting the meter across the sections I found not only that the six ohm section had gone (and was not in use) but that the top section (56Ω in the feed to the line output stage) was also open-circuit.

Oh dear, I thought. The poor chap has been chasing an elusive butterfly in a neck of the woods where there aren't any butterflies. So we put in a new dropper with a 12Ω section and of course the rest. Upon switching on, the e.h.t. rustled up nicely and the resulting picture, apart from some misconvergence, seemed quite nice too. A twiddle here and there was all that was necessary. Not wishing to embarrass the chap in front of his wife we wrote the bill out with the bare essentials, merely stating that we had restored supplies to the line timebase etc.

When they called back they were pleased that the job was done and of course he asked what the basic fault had been. "The line oscillator was not being allowed to develop its full potential, and as you asked, we replaced the dropper".

He smiled, I smiled and his wife smiled too. So off they went leaving me to bash the Avo top on the bench to clear the movement as it had fallen bottom on the floor to cause the sticking in the first place.

## *A Call from Ernie*

The phone pulled me away from a particularly awkward unit audio. It was Ernie, who is the landlord of one of our local pubs. He said he'd lost his colour and would I pop down. I said I would and perhaps he could take a brandy in the meantime as this might help him.

## *Cartridge Warning*

Just for the record (oh no!) we thought you might like to hear about the unit audio which had come in because the cartridge was damaged. We fitted a new cartridge and

plonked Jim Reeves on the turntable. There was the usual loud hiss as the stylus made its way toward "I fall to pieces", but the resulting melody was very very low and distorted. We raised the pick-up arm and moved it back. This gave a good response as did a finger on the leads to the cartridge. The amplifier was clearly in order, so we tried again.

Volume up, lots of response as the arm did its thing, lots of hiss but no Jim. Now that boy has sung loud and clear for many years on that record and if the surface noise was there, why wasn't Jim? So as not to bore you more than is usual, we'll cut a long story short. It amounted to two new cartridges being defective in a row.

The moral of this is always to have a shelf full of cartridges, because more than one may be defective and you might be led to think you are going dotty like you do when you find two new valves or transistors faulty in exactly the same way. Consumer protection? There ought to be a society for the protection of us.

### **Who's been Barred?**

Now to Ernie. To get upstairs to the pallid TV I had to go through the bar. "Here Les", he called. I made my way to the part of the bar where he presided.

"I must tell you about a friend of mine before you go up". His head jerked sideways as he said this. Thinking he wanted me at a more private part to impart some gossip, I moved along in the direction his head had indicated.

"What have you gone up there for?" demanded Ernie. As he said this I saw his head jerk again and realised that it was a nervous twitch rather than an invitation to a private tête-à-tête. I then realised why he had such an amazing success rate with the female species. I moved back to his end.

"This friend of mine has just taken a pub over in Essex", confided Ernie. "You know the first bloke he barred?" I mentally ran through a list of suspects who would be likely to cause a riot in a bar. I confessed I couldn't think, so as not to steal his thunder. "The bloody vicar", said Ernie triumphantly. "Would you believe it, the bloody vicar? ... When he got a few jars down him he was preaching to everyone so as soon as he came in all the locals cleared off and the bar was practically empty. So he barred him. He's doing very well now. Would you believe it?"

Well as a matter of fact I do believe that vicars, like a lot more of us, live under quite a bit of stress, attending to the troubles of others rather than attending exclusively to themselves, and that a couple of drinks helps to relieve the stress. And one usually leads to another.

### **Restoring the Colour**

However, upstairs the hybrid Pye produced very little in the way of colour, just a few unlocked bands across and these were weak. Knowing the area however, where the signal is pretty weak, we were not inclined to go on a witch hunt. Propping the mirror in front of the set, and tuning in a test card, we were able to achieve reasonable colour by setting up the reference oscillator a.p.c. bias preset RV10 on the front left of the decoder panel. Good colour could not be achieved because of failing green gun emission, but the results looked fairly pleasing and no one complained. Failing emission of one or more guns is a fact of life which has to be lived with as sets get a few years over their heads, and as even regunned tubes are pretty expensive, the customer is often content to jog along with less than perfection.

Returning to the bar, we reported our findings and asked if Ernie was happy with them. Ernie shook his head but said yes.

### **Smoke Signals**

Our next call was to a GEC 2040 colour set – the single-standard hybrid model. Investigating the complaint of "lots of smoke from that side", we removed the screening cover of the line output section. A glance at the line output transformer (not the original) was sufficient: one winding burnt away. "Not another one" cried the distressed owner, "that one hasn't been in a dog watch". As this was a new customer (Ken's had a nervous breakdown, so we've got quite a few new ones) we couldn't help much but it transpired that it was in fact well over a year since the new one had been fitted. So in the van went the GEC.

Next call was to an ageing Philips G6. No picture, smell of burning plastic. Makes your eyes smart. Remove screening from right side X-ray department. No X-rays, PL509 fairly hot, no voltage step up to the e.h.t. rectifier. Overwinding warm and smelly. Give estimate but advise caution as tube is known to be somewhat low. Think about it and ring us later.

Next call was to another ageing Pye dual-standard colour set. Owner would like a new set but is in love with the folding door presentation of this one and would prefer to keep it if possible. Suppressing a scream of "oh no, not another one", we asked if there had been any smoke. "Only a bit", we were informed, "but there was no real picture, only a blur".

We cautiously rotated the focus control at the rear. It didn't want to rotate and made a nasty scraping noise. This meant that it had been overheating, which in turn meant either a faulty focus rectifier (single stick) or a shorted disc capacitor (270pF high pulse – C230) or both as the control is returned to chassis via the line output transformer and usually suffers when there is trouble in the above pair. We didn't have a control with us and as replacement is no joke over went the set, off came the legs and the large and heavy beast was persuaded into the van.

### **Smoking Bush TV175**

Back on the bench there was a Co-op version of the Bush TV175. Smoke. Pitch type line output transformer, less pitch. Unload van and attack the Co-op set. Whip out transformer, unsolder wiring loom, solder to new replacement and fit. We do not fit the replacements complete with loom as although these are easier to fit their life expectancy is uncertain. We obtain our replacements from an advertiser in this magazine, and over the years have found them most reliable.

### **The Awkward Ones**

We will not bore you with the difficult jobs of that day. The ITT CVC8 with intermittent gain due to dry-joints on the bottom i.f. modules. The Pye CT200 with dry-joints in the i.f. gain and filter module. The Philips G8 with intermittent width variation due to a faulty line output transformer. Variation of primary colours on a Thorn 3500 due to the thick-film resistor unit which the nits use in place of the reliable separate wirewound RGB transistor load resistors used in earlier versions.

Needless to say they didn't all get done that day, and when we get our humour back we may tell you all about it.

# Beware the Ides of March

Les Lawry-Johns

THE first time I saw that ITT CVC9 I had a funny feeling. I didn't know then that it was going to get me as hopping mad as a mad march hare, similarly to the one we had some time ago which gave faultless performance on our bench but always showed hum bars when returned to the customer.

I know what you're thinking: check the bridge rectifier in the l.t. supply; change the regulator AD161 (or whatever); and check the 33V stabiliser D11 down the bottom on the tuner supply.

We did. We did more in fact, much more. All electrolytics in the l.t. supply circuit substituted, yet another AD161 tried (they're not all suitable even when new), yet still perfect at our place, hum bar at the customer's pad. We eventually got acceptable results by adding an extra, large electrolytic on the l.t. line somewhere on the regulator where there isn't one, and then rushed away like the coward we are and tried to forget it.

Don't get me wrong, we are second to none in our admiration of the CVC5-9 series, but there have been those occasional instances. . . . And now this one. It appeared to be simple at first. The fusible 56 $\Omega$  resistor R380 in the h.t. feed to the line output stage had sprung open, denoting an overload in the line output stage. This chassis has a 630mA delay fuse in series with this supply, the resistor springing open rather than the fuse failing if there is a prolonged but not severe overload. The earlier CVC5 had a 400mA fuse in this line: it used to pop off regularly, but that's another story.

Well, we thought. Not a sudden surge of current like a capacitor shorting or a short in the PY500 efficiency diode. No, there were no shorts to be found. So we resoldered R380 and, with the screening off the line output stage, switched on and waited. Our neon glowed a few inches away from the stage and the e.h.t. rustled up. Kermit appeared on the screen and sung a sad song. No overload. We then left it happily working while we got on with a car radio which worked perfectly on a negative supply and positive earth but not with a negative earth as we required after replacing a shorted sound output stage. It should have worked both ways as diodes are used in the supply line to ensure this. Sure enough, one diode was open-circuit, presumably cooked by the original overload. Locate and replace the diode and it worked both ways. Good.

Where's Kermit gone? Nothing on the CVC9 screen, and the PL509 line output valve overheating with only 15V drive on its control grid (should have been more like 70V). Two things to consider. Either the PL509 was drawing grid current, or there was lack of drive from the PCF802. Change the PL509. Lovely picture but not Kermit. Never mind.

We then watched the drive voltage at the control grid

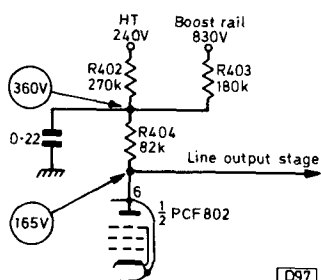


Fig. 1: Supplies to the anode of the PCF802 line oscillator stage in the ITT series CVC5-9 chassis. The main supply is via R403: the feed via R402 is a start up supply.

gradually falling bit by bit until the new valve was glowing red and unhappy. Switch off, refit the original valve and unsolder the screen grid supply resistor R421 (which again is a spring-open type, so this was quite easy). With this open, the line output stage is inoperative and tests can be made in a leisurely manner. The h.t. goes up a bit with the reduced load and this does alter things a trifle, but full line drive was not to be expected since the anode (pin 6) of the PCF802 line oscillator valve gets some of its supply from the normal h.t. line via R402 to get it started and then more from the boost line via R403 (see Fig. 1) when the line output stage comes into operation. We could not expect full line drive therefore as the h.t. at pin 6 remained at a little below 100V. It didn't fall however, and everything seemed to be in order in the line oscillator stage.

As we had already replaced the PCF802 earlier in the proceedings this was out, as were the line oscillator capacitors which we still viewed with suspicion as the result of earlier experience. Join up the screen grid feed resistor R421. Up comes the line drive and the picture for a while, and then of course it all sort of tapered off.

And then it hit me like a hammer on the head. The line drive was dropping to a figure just below what it is before the line output stage comes into operation. Where's R403? Follow pin 6 print across to R404, follow on to R403. There it is. Look on the component side. Buried beneath a transformer of course. Remove the tranny and there it is. Nice colours though. Unhook one end, about 300k $\Omega$  instead of 180k $\Omega$ , doubtless going up further under load. Replace with a 220k $\Omega$  2W type (nearest we had). Refit the tranny, switch on, and test for a long enough period whilst we dressed up the grey scale and convergence.

## Double Trouble

When the estate car drew up outside I recognised it and the driver, but not the dog in the rear guarding the Ferguson 3713 colour set. It was Mr. Doubleday bringing in his TV set as is his wont. A nice man Mr. Doubleday, but he has one distressing habit. He always repeats the last word of each statement he makes.

In he came carrying the Thorn 8500.

"Hallo Mr. Doubleday," I greeted him. "Nice dog you've got there, what is it?"

"It's a German pointer, pointer," he said. It was clearly going to be an interesting few minutes.

"What's up with the old set this time?" I enquired, for the want of something to say.

"It won't go, go," he replied. "Even when I push in the little red button it only hums and goes click, click."

"Oh dear," I said, trying hard not to say an extra dear.

Now Mr. Doubleday is no fool, he knows his onions. "There's probably a short, short," he confided.

"I agree, agree", I blurted out, and was immediately sorry. He didn't even notice.

"I'll be back about five, five. The reception is still no good where we are you know know", he rushed on. "See you then then."

He lives just outside the Medway towns, not far from the Bluebell Hill transmitting aerial but lower down the hill. It would appear that the mighty signal serves everyone except those in its shadow. Incidentally, there's a pub at the top of



the hill called the Upper Bell and one at the bottom called, would you believe it, the Lower Bell. There's more irrelevant information to follow, so don't go away.

Now to the set. Switching on produced nothing so the cut out was out. Pressing the button produced a hum and then a click as the cut out cut out (this sort of thing gets you after a while). Having been fooled in the past, we checked the current through the cut out. 4A. This was a brief check, and the anti-surge fuse didn't have time to blow. With that relatively small overload, clearly the mains filter capacitor and the rectifiers could not be at fault so suspicion fell upon the line output transistor.

The collector of the transistor is connected to the top of the line output transformer via a brown lead and a series choke. Unhooking this is a matter of seconds. With this off the set came on with the tube heaters glowing, so either the transistor was at fault or there was a short associated with the circuit.

Withdraw the chassis partly and lower the right side panel to gain access to the line output stage's working parts. With the brown lead disconnected, the collector of the line output transistor is isolated except for the heatsink which is fairly hefty but insulated by its chassis pegs. Checks proved that there was a leak from the collector to the emitter. There's the usual tuning capacitor (C406) present, but this is rarely at fault and wasn't on this occasion. Other checks showed no fault so we fitted a nice new transistor, using a 2SC643A to replace the original BU105/02.

All clear. Reconnect the brown lead and make sure that the focus plug hasn't been pulled off in the struggle. Switch on, slight buzz and up comes the e.h.t. Nice. Connect aerial and select bottom button to tune to London (leaving top three alone as they are tuned to Bluebell Hill but our aerials do not look that way). Not a bad picture.

Switch off and refit the chassis fully in. Insert screws and replace rear cover, at the same time switching on again to see that all is well. It wasn't. Buzz and click and we were back to square one.

Check again. New line output transistor not new any more. Slide out chassis. No shorts, no cause. Oh well. Fit another transistor, recheck and try again with the chassis still partly out. Lovely. Leave for some time, no trouble.

Carefully slide chassis in. At the moment it was fully in there was a sharp click and another line output transistor bit the dust. Not much fun. Close inspection showed that as the chassis was pushed fully into the cabinet the e.h.t. cable doubled back and touched the input to the rectifier, whereupon the insulation failed at that point and bang went the line output transistor. There was nothing wrong with the rectifier, only the cable near the e.h.t. clip end. This was shortened and the clip refitted, thus killing two birds as it were since the defective bit was out and the cable no longer doubled back. Another new transistor (must order some more) and all was at last well.

### **Some Quickies**

Life then settled down to the dull routine of run of the mill jobs. A lady brought in a Murphy V1400 which is a 14in. portable made in Japan.

"No sound" she said. There was no sound until we put it on its face to remove the cover. Then the sound came back. Tilt the set up and off went the sound. This proved to be nothing more than a slightly defective volume control (knob at the front, thus pressure restored sound), and this responded to cleaning.

What she had omitted to mention however was that ITV

on channel 23 couldn't be tuned in though the higher channels could. As it happens, with this type of tuner the top can be easily taken off, or rather the side as the side was at the top . . . you see. This revealed the single slab stator and the thinner rotor plates on either side in each section. The rotors were not fouling, so we cleaned off the grease on the spindle in each section and on came the ITV, now easily tuned.

Next was a nice white Waltham portable, only a week or so old. Would we help? Blown fuse, shorted diode in bridge. Replace diode, replace fuse, worked for a short time, fuse blew. Another diode shorted, would you believe it? Put another one in and another fuse, only to find that the primary winding of the mains transformer was now defective with shorted turns. Consult with customer about implementing warranty.

Thorn 1500 with intermittent vision and sound signals. Guess at faulty BF197 transistor in final i.f. stage. Guess right for a change.

### **Two hours, then it went ping**

Finally a Philips G20T325 (320 solid-state monochrome chassis). No results due to the h.t. line resistor R4465 having sprung open (feed to the line output stage). Check possibilities, no fault. Solder up resistor, picture and sound o.k. H.T. a trifle high: reset R5630 for 158V HT1 line. Then the mains fuse shatters.

Why? Check around, find that the bridge rectifier is shorted on one leg, negative as usual. Remove faulty bridge and carefully fit another *of the wrong type* (they say that confession is good for the soul). Despite the fact that there were plenty of BY179s around, I had carefully selected a BY164 (42V, 120V VIRM) and put it slap across the 240V mains input. Incredibly it held and functioned.

I woke up in the early hours of the morning, suddenly fully aware of what I'd done.

"What's the matter now" asked my always sympathetic spouse. "Is the wind worrying you?"

"I haven't got the wind" I snapped, and then realised that there was a force nine gale outside. "Was that slim Philips black and white set collected?"

"Yes, nice fellow too."

"He won't be nice when he brings his set back: I put the wrong rectifier in and it won't last a dog watch." I slipped back into a troubled sleep, with green bridge rectifiers dangling before me instead of black ones.

Sure enough he came back and I explained my error. He said he was glad it wasn't the set, as he was beginning to think there was one of those gremlins loose inside.

Opening up the set I was amazed to find the fuse intact. "How long did it last?" "About two hours and then it went ping." This meant that the spring of the line output stage h.t. supply resistor R4465 had sprung open again. Not the rectifier at all: back to the original illusive intermittent fault.

I hurriedly removed the BY164 and substituted the correct BY179. Resoldering R4465 and then switching on produced normal results. To me this meant either that the h.t. rectifier thyristor was leaking after a period, or that the line output transistor was acting up. Despite the earlier drain on our resources of these latter items we still had a few left of the correct type – the 2SC643A will replace the BU105, BU204, BU205 and BU206 (not the BU108, BU208 and BDX32 however). So we fitted a new line output transistor and left a voltmeter connected to the HT1 line to see whether it crept up over a period. It didn't, so we concluded that the BU205 had been at fault all along and that the failure of the BY179 had been only a red herring.

# CA Tastrophe

*Les Lawry-Johns*

I'M not a cat lover. On the other hand, I don't hate them either. Our own cat Spock has her endearing, selfish little ways, but I wouldn't dream of harming her. Except that is when she brings in a poor flapping bird and proceeds to torture it. Then I could kill her without a second thought, regretting it later of course. She lives, however, and grows fat. The fatter she is, the less likely she is to succeed in catching a bird. So we live in peace. This is just as well because whenever I have lost my temper with a cat I have always come off second best.

A little while ago, I was called to a house to attend a Bush CTV1122 which had "gone bang". As I was removing the rear cover I became aware of two things. First, there was a horrible smell which had not been immediately obvious lingering around. Secondly, the window near me was wide open on this cold day.

The lady of the house explained that her cat had had kittens, and that a horrible tom cat had been in and had left the smell in addition to having made an attempt to kill the kittens. As she returned to the kitchen, shutting the door behind her, I resumed my job behind the Bush. . . . Being partly concealed, I was not noticed by the thing which entered through the window. It was the ugliest ginger tom cat I have ever seen, and it was obviously going to have another go at the kittens. I rose to my full height.

"Got you, you horrible swine," I hissed. "Now you'll pay." The cat glared at me with hate filled eyes. Every hair on its scraggy body stood out, and it looked twice as big as it had done a moment ago. Its back arched and it spat out its challenge. Who would be the victor in this battle of the giants?

I made the first move: my screwdriver sped through the air with deadly accuracy. The cat leapt on to the sideboard and the screwdriver knocked a chunk off the coffee table. Oh dear. I looked for another weapon. The vacuum cleaner hose. Just the thing to put an end to this vile beast. I swung it viciously as the cat leapt again, and all the silver on the sideboard was scattered in all directions together with family pictures and a bowl of mixed nuts.

The cat then really got going. It literally tore round the walls, never once touching the floor. Down came the curtains and several other items which had adorned the walls. I aimed another blow at the beast and missed again. Missed the cat that is, I didn't miss myself since the metal end of the hose rebounded off the wall, knocked my glasses off and sliced my ear.

Since the curtains were no longer covering the window the cat vanished with a parting hiss, leaving behind the most horrible smell, easily eclipsing that of a burnt up tripler. By this time the lady of the house had reappeared. Viewing the devastation, her eyes widened with horror. "Has the set blown up completely this time? Look at my curtains and silver and everything . . ."

"Calm down" I urged her, quickly replacing the silver and pictures and things. "That tom cat came in and turned the place upside down and attacked me, that's all. Send for the police, it'll have to be shot."

Having rehung the curtains, some sort of order was restored. . . . So rather shaken I returned to the Bush to

investigate the source of the bang. Lower left 3·15A mains supply fuse missing except for its metal ends. Remove power board. Lots of burn marks and damaged print around the base of the thyristor (BT106) and down to the surge-limiting thermistor which didn't look up to much either. After cleaning up the area carefully, we fitted a new thermistor and a new BT106, then checked the diodes and everything else in sight. All seemed well, so like a fool we put it back without looking at the print on the decoder panel.

With a nice new 3·15A anti-surge fuse in we switched on. On came the sound and the e.h.t. rustled up. Easy job after all.

"Picture o.k.?" we enquired from our position behind the set.

"No," said the fair lady.

"Oh," we said as we clambered around to the front. Turning up the brilliance and contrast did nothing. There was only a dull blue glow which remained unaltered by anything. Tube base voltages revealed that the first anodes were normal but the cathodes high. The bang must have damaged the SL901B demodulator i.c. we decided, reasonably enough. We didn't have one with us. So we put the thing together and took it to the van, promising to return it the following day all being well.

On the bench, out came the decoder panel, out came the desoldering braid, out came the i.c. and in went a new SL901B. Brightness restored, contrast o.k. Careful tuning brought in some sort of colour, that is if you like green faces. Despite the fact that we had replaced the upper i.c., we were still too stupid to examine the board closely on the print side.

Pressing the buttons a few times restored normal colour about once out of every three goes. This was not a good average, so we checked the ident control which didn't help matters. Looking on the black side we concluded that the lower i.c. had also been dealt a mortal blow. Out came the decoder panel, out came the desoldering braid, out came the SL917A and in went a new one. All to no avail and the time was galloping away.

"Bistable, bistable, it's that cat's fault," I mumbled. Out came the board once more (I've never got round to a set of extension leads, as we don't deal with that number of these models and we rarely have faults on the decoder anyway) and this time we did what we should have done in the first place. Careful examination of the print around the ident detector transistor 3VT11 (BF194) showed discolouration. The transistor in fact was open-circuit base-to-emitter. Clean up the tracks, fit for a new BF194, and flesh is flesh (leaving Kermit out of this).

So ends this catalogue of disaster. The moral is: if you have a blow out, check up on the semiconductors on the adjacent panel. Oh, and never try to kill a cat.

## *Thorn 1600 Chassis*

A young fellow brought in a nice white mains portable and asked us if we could repair it. It was an Ultra Model 6831, fitted with the Thorn 1600 chassis. As we were removing the rear shell, he remarked that it had been with a firm many miles from here for a period of eight weeks, and that they had given it up as a bad job.

"Will it take more than a few minutes to do? Only my friend's waiting in the car and there are double yellow lines you know." A swift check revealed that the BU205 line output transistor was a dead short, and it was obvious that a lot of other work had been done around the line timebase. The alarm bells rang. Take care they rang.



"Leave it with us a few days and we'll let you know" we said cautiously. Off he went, leaving us to sort out what had been done and why. The BF337 line driver transistor VT15 had been replaced and appeared to be in order. With a weather eye on our depleted stock of line output transistors (Mr Doubleday you remember) we removed the side panel which holds the line output transistor and to which the body of the TIP31 regulator transistor is bolted (having released the latter), noting that the top screening cover was missing. This enables the flyleads of the line output transistor to be removed and the BU205 to be replaced.

We fitted an approved replacement for the BU205 and hooked up a large wirewound resistor in series with its collector lead in order to protect it in the event of it being switched on for too long. This appeared to be unnecessary, as it did not switch on at all when we had cleared the decks for action and switched the set on. The BF337 was overheating however. Checking the base and emitter produced an immediate change of conditions however and the line output stage started to function, the tube heater lighting dimly etc. Obviously we had prodded something into life. It was time for thought.

The RC network connected across the primary winding of the driver transformer T1 (see Fig. 1) is essential to prevent "ringing", which would tend to keep the BF337 conducting. If the BF337 was overheating, it was conducting too long. So it was prudent to check these damping components, particularly as application of the meter could have perhaps sealed one up so that normal working was resumed. Investigation showed the components to be R139 6.2k $\Omega$  (2W) and C122 0.0056 $\mu$ F (polystyrene). Ah ha. In the event however the capacitor was not at fault: we had jumped to yet another wrong conclusion. . . . Such was our confidence however that we removed the wirewound resistor from the feed to the line output transistor's collector and then switched on. Nothing.

We again applied the test prod to the base of the BF337, and on came the tube heater and a raster appeared on the screen. The raster then vanished and there was a click from the line output transistor. Hurriedly switching off we found the line output transistor to be a dead short and we were back to square one.

Convinced that the trouble was in the driver stage, we carefully checked all the components there, after removing the BF337. An ohmmeter reading from the base connection to the h.t. line showed 5M $\Omega$ . We shook the meter and rechecked the range. The reading should have been more like 500k $\Omega$ . No, 5M $\Omega$  it was. R138 turned out to be a tiny 470k $\Omega$  resistor which had gone high, not allowing the base of the BF337 to discharge. Fitting a larger 470k $\Omega$  resistor

and refitting the BF337 and another new line output transistor (2SC643A) produced normal working and another threatened nightmare was averted. This is the first time we've encountered this one.

Our usual troubles with the 1600 chassis have been around the e.h.t. rectifier: either the rectifier (pencil type) itself or insulation breakdown has been our lot. It should be appreciated that the e.h.t. lead is screened and that the screening is earthed. This can be a source of trouble, but is fairly obvious and unlikely to cause heartache. The proximity of the screening cover seems to promote discharge from, and breakdown of, the insulation of the e.h.t. rectifier's end caps.

### LT Transformer Trouble

We had a call to service a Pye hybrid colour set the other day. It was fitted with the 691 single-standard chassis, which has the metal housing over the line output transformer and e.h.t. tripler as opposed to the more open arrangement of the later 697 chassis which has the vertical printed panel on the right side. The later models use a revised mains transformer with a thermal cutout incorporated in the body of the transformer. Earlier versions did not have this, and under some fault conditions the transformer can overheat and suffer damage before the mains fuse fails. The set we visited had suffered this condition, and it was not the first we've encountered.

The complaint was that the picture and sound had gone off and that there was a smell of burning before the set went dead. When these symptoms are reported, our first suspicion is the small bridge rectifier which provides the l.t. supplies. If there is a short in the h.t. line or in the line output stage, the mains fuse normally fails and puts an end to any hanky panky. A smell of burning however means either a short in the boost line feed to the c.r.t. first anodes (the sound continuing for a time) or some l.t. fault if the sound fails immediately.

Our first action therefore was to withdraw partly the right side unit and turn it, having ensured that there were no shorts from the PY500 top cap to chassis. Turning the unit exposes the h.t. and l.t. supply components. An ohmmeter test on the BY164 bridge rectifier confirmed that there was a direct short from the positive leg to the a.c. input. Removing the BY164 is only a matter of moments, and once removed a recheck showed that the short was indeed in the rectifier and not in the circuit. A new rectifier was fitted and the unit replaced.

A new 2.5A anti-surge fuse was then inserted, but this blew immediately the mains was applied. When the meter was applied to the l.t. transformer primary winding it swung over further than normal and confirmed our suspicion that this was at fault and not the filter capacitor or any other easily replaced component. Leaving things as they were, we beat a hasty retreat back to the workshop where we found that we had just one spare transformer. Returning to the house thus armed, we inverted the power unit and extracted the defective transformer. It has only about six connections, so the new one was easily fitted. Another new fuse and we were ready to go again. Switch on and the immediate rush of sound confirmed that the short had been cleared. The picture was good and little more needed doing.

The lesson then is that if the model is the original dual-standard or the subsequent single-standard one with the metal box on the right side, a defective bridge rectifier can ruin the mains transformer if the set is not switched off immediately the sound and vision fail.

And, oh yes, do be kind to moggies.

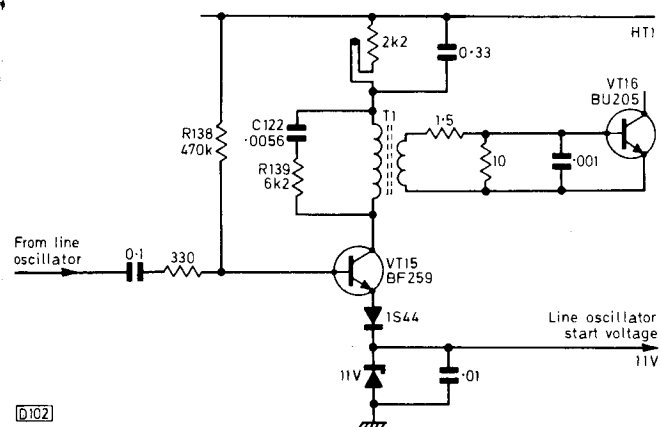


Fig. 1: Line driver stage, Thorn 1600 chassis. In earlier versions VT15 was type BF337.

# Gate Crusher

Les Lawry-Johns

WHEN we featured a servicing article on the Waltham Model W125 large-screen monochrome receiver in the August 1977 issue we promised to report further on the set as its fault habits developed. We haven't come across many common faults so far, apart from the need with all of them to adjust the height control (which has a spindle protruding through the rear cover and so presents no trouble) after a short while in service. We have had some encounters however, one of which is worth relating...

The phone rang. It was Mr. Shuttlecock.

"That Waltham TV we got from you a few months ago is going funny. Can you call today?"

"What's it doing, Mr. Shuttlecock?"

"It keeps going dark and then coming up light again. My wife thinks it's something loose as nothing's been tightened up since we had it."

"How often does it do this Mr. Shuttlecock?"

"Oh it might be all right for hours, then it'll go right dark and come up again and stay all right for a few more hours."

"I'd better collect it and have it here for a while. I'll bring you another set."

So off we went and installed another set and brought the Waltham in for inspection. Needless to say it wouldn't play for us at all. Just stayed at the same brightness level for hours. Until we adjusted the front contrast control that is, then it started its pranks, the signal strength increasing dramatically to produce a very dark and over contrasted picture. So the trouble was not after all a variation of brilliance, rather one of varying a.g.c. Oh dear.

The triode section of the PCL84 (see Fig. 1) functions as an a.g.c. gate, sampling the voltage across the video amplifier's cathode resistor R122. This voltage is applied to the triode's cathode, the actual operating or conducting level of the triode being determined by the voltage applied to its grid by the contrast control R503 and the preset contrast

control R130. The d.c. voltage at the anode controls the a.g.c. line, all other things being equal. Where to start? Change the PCL84 was the coward's way out and was promptly tried. With no success of course.

Some time was then spent chasing the variation of a.g.c. control voltage until we removed the aerial, something we should have done in the first place of course. It was then confirmed that the triode's grid voltage varied very occasionally, a cold check revealing that once in a while the resistance from the PCL84 triode's grid to chassis would suddenly change. All the resistors in this circuit are of high value except for the preset R130 which is only 25k $\Omega$ .

Our brilliant mind instantly grappled with this problem, and after due time we came to the conclusion that all was not well with the preset R130. Changing this brought about complete stabilisation of the contrast, and what could have been a very awkward job was polished off without too much trouble – except for the sound.

Now no persons living or dead had mentioned this. On test however, we noticed that the sound suddenly became "thin". Whilst it remained audible, it certainly weakened and lost bass. Due to the intermittent nature of the fault, it took us some time to arrive back at the 0.01 $\mu$ F coupling capacitor C215 which is by the side of the screened section to the left and slightly lower down from the PCL86 audio output valve. Replacing this brought back normal sound, which is very good in these receivers, in no small part due to the generous loudspeaker.

## A Visit to King's Drive

So we were now in a position to return the set. It should be clearly understood that the Waltham W125, originating as it does from a land where there is no shortage of wood, is no lightweight. Having removed it from the estate car it was necessary to drop the tail gate before taking the set into the house, as the dog had decided to accompany me and given half a chance he would have hopped out for a sniff round. I then had to negotiate Mr. Shuttlecock's front gate, which is spring loaded. Having done this and arrived at his door we were a trifle puffed. In answer to our third ring Mr. Shuttlecock opened the front door and after an exchange of pleasantries led us into the room where the TV set lived.

Having fixed the set so that it displayed a rock steady picture we were subjected to an intensive interrogation by Mr. Shuttlecock as to what the exact trouble had been. We explained in some detail, none of which conveyed anything at all to him, but he was determined to extract the last detail. At last he appeared satisfied. We turned to pick up the loan set and depart when Mrs. Shuttlecock arrived.

"Ah, the television set is back", she cooed. "Now tell me Mr. Lousy-Jones, what exactly was wrong. I would like to know".

"Oh dear" I stammered. "I've just told your husband all about it." "Ah yes," she persisted. "You must tell me as he has such a bad memory you see".

So out came the old spiel again, Mr. Shuttlecock's head nodding in agreement. At last I was able to escape.

Picking up the loan set, I was obstructed by Mr. S busily rearranging furniture, mainly directly in my path.

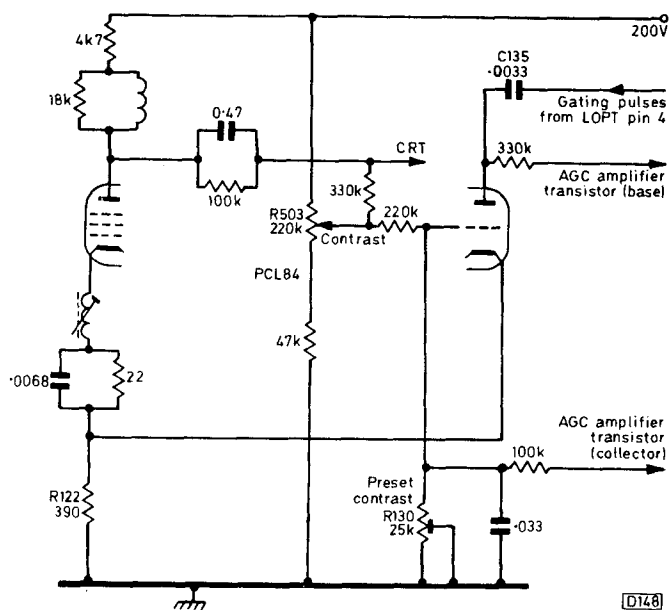


Fig. 1: A.G.C. gating circuit used in the Waltham Model W125 – the PCL84 triode is gated at its anode.

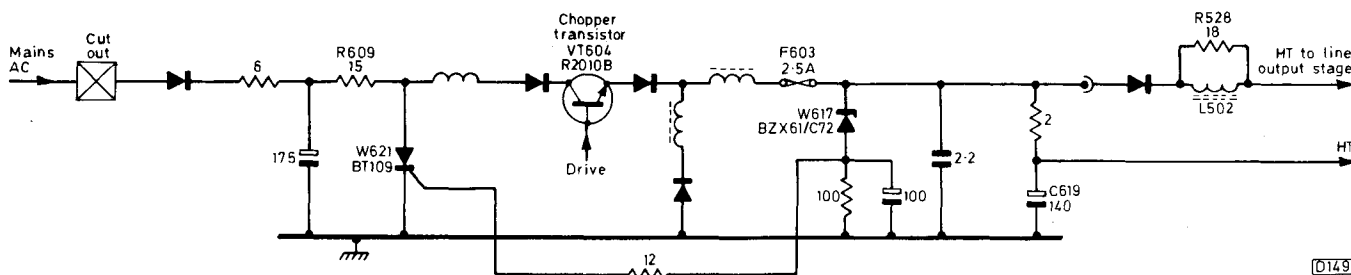


Fig. 2: Path from the mains input to the line output stage h.t. supply point in the Thorn 3500 chassis. Various problems included the core having fallen out of L502.

"Could you open the door?" I begged him.

"Ah yes, ah right, yes of course". He opened the front door and shot off down the path to open the gate. I followed and was about to pass through the gate when he let it go and shot toward the estate car.

The gate swung as I was passing through and combining with my forward movement dealt me a mortal blow in the groin.

"Ahhhhhhhhh!" My scream rang the length of King's Drive and Queen's Walk. The pain was so intense that had the set not been mine I would have dropped it. As it was I waltzed around howling with pain and fear for the damage that might have been wrought.

"What on earth's the matter," enquired Mr. Shuttlecock. "The neighbours will think you've got a screw loose."

"You let the gate go and it's damaged me for life."

"Oh dear", commiserated Mr. S. "Your face is green, I'd better go and tell my wife what has happened." This was too much for me. Hopping in the front I drove off as fast as my legs would enable me to change gear.

### Wanted by Five

On our return there was a batch of jobs "wanted by five o'clock." First was a UA3 unit audio. This unit has stereo v.h.f. radio as well as medium and long a.m. The complaint was not the usual one of one side dead or the unit totally out of action due to defective audio i.c.s - we'd been looking forward to the time when we would get one in without this chip trouble. Here it was.

Records played nicely and full output from the audio unit, but the radio reception was very poor both on a.m. and v.h.f. So we started by making an assumption, which of course turned out to be the wrong one. We ruled out the v.h.f. tuner and the stereo decoder, and concentrated on the supply voltages to the common i.f. stages, transistors etc. All proved to be in order, and signal injection didn't help much either. We then did what we should have done in the first place and studied the circuit diagram more closely. This showed that the detected a.m. output is also fed into the decoder i.c. Replacing this restored normal reception, which only goes to show that making assumptions (in this case that the only common ground was the mixer, i.f. and supply) can save time on some occasions but waste far more on others.

### Cut Out Cuts Out

Back to TV for the second job, a Ferguson colour set fitted with the 3500 chassis. Cut out operates as soon as it's pressed. Correction. Cut out operates almost immediately. During the very brief operating period (say one second) R609 (see Fig. 2) heats. Remove the supply plug to the line timebase. No difference. Check chopper transistor R2010 (VT604). Dead short emitter to collector. Replace and

check for shorts. When the line timebase supply plug is inserted a short or near short is recorded. Make a more direct reading on the line output transistor (R2008) and find this also a dead short. Nagging doubt creeps into usually blank mind. Let's make an assumption (not another one surely?).

If the chopper supply transistor shorted, the sudden voltage rise should cause W617 to conduct (it should conduct at 72V) and turn on the crowbar W621 which should cause the cut out to operate. Well apparently it was. Yes, but why the shorted line output transistor? Better check W617. Missing. Only the wire ends protruded from where it once was. Check the crowbar. This seemed to be in order.

As we were fitting a new 72V zener (W617 - BZX61/C72) we got to thinking. If the rise in voltage had caused the line output transistor to short, why hadn't the 2.5A fuse F603 failed? Removing it and taking off our glasses so as to be able to see properly we found it marked 5A. Ah....

So with a new chopper, new line output transistor and new zener, plus a 2.5A fuse of course, we felt brave enough to switch on. Buzz, loud sound hiss (no aerial), rustle of e.h.t., tube heaters alight. High pitched "tweaking" sound and we just knew the picture would be rippled.

Insert aerial. Colour o.k., sound o.k., picture rippled. Slap another electrolytic across C619. Better but not cleared. Check R528 (18Ω, wired across L502). Turned to dust. Replace, but hardly any difference. These components are in the supply line to the line output stage: R528 is inside sleeving, and is revealed when the beam limiter board is lifted. Bearing in mind that there had been a difference when R528 was fitted, we tried a capacitor of around 0.15μF across L502. Ripple cleared. Funny. Enter friend Ray.

"Can I take a set-top aerial to try over the flats Les?" he bawled.

"Of course. I say, why should a capacitor across L502 stop a ripple usually associated with lack of smoothing in the chopper line?"

"Cos the core's dropped out of L502 and it's not smoothing. I thought everyone knew that" said Ray.

"Of course, of course", I mumbled. "I was about to

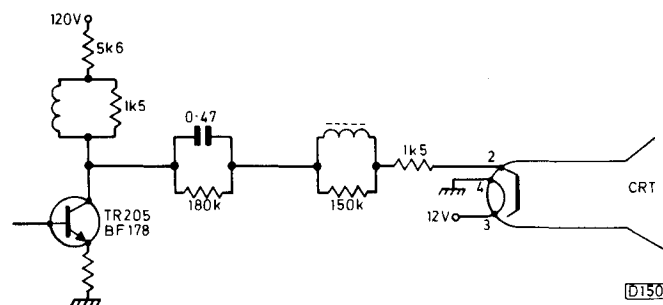


Fig. 3: C.R.T. cathode drive circuit used in the Indesit T12LGB monochrome portable.

check the presence, or rather the absence of – well where would it be?”

“Probably dropped out of the bottom on the way in”, said Ray. “I’ll send you one up later.”

“And he did. And it did. And that’s all there was to that one. Just between you and me, young Ray is not so hot on 1933 Ferranti radio sets.

### Tube Tapping

Still demoralised and confused, we commenced to direct our considerable talent to an innocent Indesit T12L BG which just happened to be sitting there. The complaint was that the picture would vanish and leave an over bright raster. Switching on produced a normal speckled raster (no aerial) which suddenly became speckless (speckleless?) and over bright, suggesting that the supply was absent from the collector of the video output transistor.

Having located the video output stage (TR205, BF178) we found the collector voltage normal (about 60V), also that the speckles had returned denoting normal operation. Removing the fixing screws, we withdrew the chassis whereupon the fault condition returned. A quick stab of the meter revealed that the video stage was still working but alas so was the screen.

Feeling a trifle frustrated, we decided to attack the tube base voltages. Now these small tube bases always confuse me, and it takes some time for me to sort out which pin is which. The first anode was easy as it was at over 300V. The trouble was, I couldn’t find the cathode’s 60V. Blind panic began to take over. It wasn’t surprising however because the screen was once again over bright. I made several assumptions (each of them wrong) before I calmed down and became merely irrational. I spoke to myself sternly: first positively identify the cathode pin.

This proved to be pin 2, with a 1.5k $\Omega$  resistor (Fig. 3) leading back to the video circuit, first via a choke wound on a 150k $\Omega$  resistor, then on to a 180k $\Omega$  resistor shunted by a capacitor, then to the collector of the BF178. I left a meter on the collector and another on the c.r.t. base socket which was now a normal 60V at pin 2. I’d just about given up hope of the fault returning when it did. Collector 60V, c.r.t. cathode 0V. Oh dear. It had been so long since I’d had a monochrome tube with a heater-cathode short that I had omitted to take this into consideration. Removing the tube base socket restored the 60V, putting it back produced 0V. I cursed loud and clear.

“Now what have you done” asked my angel, tender and considerate as always.

“I’ve spent some time trying to find out what’s wrong with this, when all I had to do was tap the tube neck, like this, and it would have shown up right away” I moaned, tapping the tube neck. Immediately the short cleared and back came the speckles.

Tap it again and back comes the short. Tap tap. No short. Tap tap tap. No short. Test for hours, no fault.

In the meantime my adorable one was having her say as usual. “Instead of tapping it, why don’t you slap a transformer in like you did on mum’s.”

“Because mum’s isn’t expected to work on a 12V battery, that’s why.”

“Perhaps they don’t want to work it from a battery.”

“Shut up and get that cat off the bench.”

The decision as to whether or not to order a new tube was not necessary as the short has not recurred (so far).

Thinking back to Mr. Shuttlecock, the only comfort I gained from all this is that at last I understand what is meant by “gated pulses”.

## next month in

# TELEVISION

### ● SERVICING THE PHILIPS G8 COLOUR CHASSIS

In answer to many requests, we are embarking on a detailed examination of this popular chassis which was first introduced in 1970. The various panels will be dealt with and their common faults listed.

### ● VERSATILE SYNC PULSE GENERATOR

Despite its simplicity, the sync pulse generator described in our May 1977 issue suffers from inaccessibility. For some applications, constructors may wish to modify the circuits and extend the functions. In response to this need we are describing an inexpensive (around £25) unit using readily available components. It is robust, and a number have been built and tried out in various applications. The design should fulfil virtually everyone’s needs, particularly in the CCTV field. The circuit is straightforward, yet features automatic interlacing. Construction is non-critical.

### ● INTRODUCTION TO THE ‘SCOPE

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# Never tap an Aerial with a Two Penny Piece

Les Lawry-Johns

SOME very queer things have been happening lately.

Take the other day for instance. In walked this young chap carrying a white portable TV set of doubtful origin: you know the type, made in Korea or somewhere and obtained through a club (the set not the chap).

"I'd like you to look at this set for me."

So I stared at it hard for quite a while, which didn't seem to do very much except that I get spots before the eyes if I look at white things too long.

"I don't mean look at it, I mean tell me what's wrong with it," he said.

Not wishing to be awkward, we plugged it into our ever ready, cater for everything, multisocket. Its own aerial didn't do much at all, and an outdoor aerial produced only a very noisy picture and hissy sound.

We pronounced our judgement: "It doesn't work very well."

"I know that" he said impatiently, "I'd like to know why it gave a perfectly good picture on its own aerial until I tapped it with a coin."

Working at fantastic speed, our computer brain added up the possibilities and came up with the probabilities.

"We hope it was a copper coin sir. Could be nasty had it been silver."

"It was a two-penny piece, but what difference could that make?"

"Well, considering the conductivity difference between copper and silver, plus other things, a ten penny piece could have had five times the effect."

He looked at me icily. "I have never understood currency fluctuations, but I still cannot see how this affects my television."

Sherlock Holmes took over.

"I should imagine you were wearing some sort of man-made fibre attire, had been engaging in an energetic pursuit, or had been driving a car, wearing gloves and rubber-soled shoes."

That did it. "Well I never" he said, or words to that effect. "I had been out running in my track suit."

"Ah well Mr Watson, you had charged up to a very high potential, and tapping the aerial, as you did, discharged you through the set you see."

"Well I never" he repeated. "I hope I haven't caused too much damage."

"Leave it with us and we'll see what can be done. Look in tomorrow."

So off he went and, rather intrigued, we had a look at the set. The aerial socket was not isolated and was directly coupled to the tuner. Oh dear, the tuner. Most inaccessible. We were finally able to undo the front fixing nut after removing the tuning knob, and with some difficulty extracted the tuner to the extent of the leads.

The cover was secured by a wire clip in the shape of a sawtooth waveform. Removing this didn't really help, so the leads had to come off. The tuner was then placed on the operating table.

We were interested in the r.f. amplifier transistor. Where was it? Where it should have been there was a pinhead with four tiny connections, one leading through into the next compartment. We concluded that this was the collector. The

base leads (two) were joined and the emitter went to earth via a 1k $\Omega$  resistor. Open-circuit base-emitter.

We had nothing like this except some much larger types used in varicap tuners (and you think these are small?). Viewing the space available however, it seemed possible to use a larger transistor. So we went from the sublime to the ridiculous and selected from the transistor stock a BF180 with nice long legs. Leaving the collector long and cutting the others shorter, we were able carefully to fit it in with the able assistance of the full nursing staff. Connecting up confirmed that the masterly surgery had not been in vain.

Getting the tuner fully back into position was another story, but a dull one.

Mr Watson was very pleased and rather relieved, since he'd borrowed the set from a friend.

## Mrs. Smallpiece's Green G8

It was getting near the end of a very frustrating day. Almost everything that could go wrong had. We were just finishing off an Indesit T24 with the left hand, whilst the right was engaged in cleaning the head of a cassette recorder, and at the same time we were telling a chap how to fit a cartridge to the playing deck he had just purchased from a discount warehouse because they couldn't tell him.

The phone rang. It was Mrs. Smallpiece. We had fitted a regunned tube in her G8 (Philips colour) about eighteen months earlier and only the previous day had put in a new tripler, so she'd paid out a bob or two.

"It's gone all bright green and that seems to fade away" she said in her low, seductive voice – the kind that makes you think X certificate thoughts.

"I'll be there before you can say no" I assured her as different possibilities (fault ones of course) cascaded through my mind.

Finally managing to fit the back on the Indesit (no mean feat), and disposing of the remainder of the peasants, we put "closed" on the door and prepared to kill the dragon that was troubling Mrs. Smallpiece.

"Now what are you up to?" enquired my little prairie flower.

"I've got to have a look at Mrs. G8's smallpiece" I stammered. "It's gone all green."

"You went there yesterday, didn't you?"

"Yes, it's a pity last thing like this but I can't leave it love."

"Well it's time Ben had his run. We'll come with you and I'll read the evening paper while you're in the house."

"Right-ho precious, glad of a bit of company really."

So we packed all the gear in our ageing estate car, including the dog and the first G8 signal panel that came to hand, and off we went.

Mrs. Smallpiece answered the door and ushered me into the room where the sick G8 lived.

"Thank you for coming so quickly" she murmured. "You must be very busy."

"I have a fair bit to do" I admitted, looking at her long dark hair. She said the set had made a sparking noise and the screen had then flashed up bright green. Whilst I moved the set out and removed the rear cover, she sat in an

armchair opposite and presented a very pretty picture herself.

Switching on the set produced a heavy spark across the focus spark gap on the tube base socket, heavier than 5kV could have done. A new tripler yesterday, intermittently excessive focus potential today. There was no more discharge however, so for the moment we concentrated on the green screen which the beam limiter was trying to cope with.

As expected, voltage tests revealed a very low voltage at the collector of the green output transistor, only about 50V instead of well over 100V as on the red and blue output transistors. We concluded (wrongly) that the spark had damaged the green output transistor, and to hurry things up a bit we whipped out the signal panel and slipped in the replacement. This was the third mistake in as many minutes, surely our darkest hour.

Switching on again I raised my head over the top and looked at Mrs. Smallpiece (legs first frankly). "Better now?" "No dear, it's still green."

So was I. Head down, no more would our concentration wander. Green collector just as low as before. Remove green flylead from panel, voltage much higher. Oh dear, what could be pulling the voltage down on the tube base socket . . . or in the tube?

With the green lead reconnected but the tube base socket off the tube the voltage remained higher, but still not as high as red and blue. With the tube base on, the voltage on the green cathode fell dramatically. Clearly the tube had suffered as the result of the discharge across the focus gap, or across the tube base socket.

Green gun, grid-to-cathode or heater-to-cathode. Grid-to-cathode leakage didn't bear thinking about. We could cope with a heater-to-cathode leak however.

Switch off set, take off tube base socket. No readable leaks on tube pins. Think carefully. Heater is supplied by a transformer, and the supply is not earthed at the transformer end (see Fig. 1). Check tube base print. One heater pin print goes to chassis. Cut through print, leaving heater connections intact but not earthed.

Right leg getting cramped. Move leg out and tread on removed signal panel. Crunch. Try not to panic. Will repair panel later. Fit tube base socket. Check leads. O.K. Switch on.

"How's that?"

"Still green."

Anguish. *Panic*. No, wait. Wait just a second. Look at screen. Green yes, but not brilliant. Check output transistor

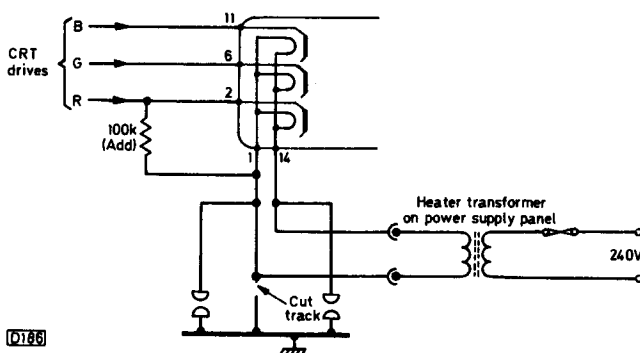


Fig. 1: Dealing with a heater-cathode short on the Philips G8 chassis.

collector voltages. Green lower than the other two. Remember. The panel we picked up was the one which hadn't been checked. The only one not checked, you fool. Why did you have to go and tread on the one you took out?

Checking showed only a crumpled preset. Delve in tool box. Got one. Plug in soldering gun. Out preset, in new one. Change panels. All cathodes now at same potential. Plug in aerial. Lovely, but hang on. The new but suspect tripler is still in and the tube heater is still floating. Stagger out to car.

"Having trouble love?"

"Won't be long now. Once more into the breach dear friends."

In went another tripler. In went a 100kΩ resistor from the heater to the nearby red cathode to keep the potentials just about even.

Clear up and engage in small talk with Mrs. Smallpiece. Just getting down to the nitty gritty when a large young man enters. Must be six feet four, about twenty I'd say.

"Everything all right mum?" "Yes love", says Mrs. S. "Les says it wasn't much really". "Made him sweat though, didn't it?" It did, it did.

So this is a clear example of blundering inefficiency. My inefficiency. *Item one:* The spare panel should not have been taken out unless it had been proved good. *Item two:* The fact that the green output transistor's collector voltage was low did not necessarily mean that the transistor or its operating conditions were wrong. The first move should have been to remove the flylead from the panel to the c.r.t. base and if the voltages on the panel returned to normal there would have been no need to let loose wild geese. *Item three:* Concentrate on what you are doing, not on what you might be doing.

## SYNC PULSE GENERATOR

### Parts List

#### Counter Chain and Logic:

IC1 - IC4	7490
IC5, IC6, IC14	7404
IC7	7445
IC8	7420
IC9, IC11, IC15	7400
IC10	7410
IC12, IC13	7430
R1 - R4	4.7kΩ
C1 - C4	330pF
16 off 0.01μF	disc ceramic decoupling capacitors

#### Power Supply:

T1	12-0-12V secondary at 1A. Marshall's MT213
IC1	7812 regulator
IC2	7805 regulator
D1, D2	1N4001
C1	2,000μF 25V electrolytic
C2, C3, C4	0.1μF polyester
C5	250μF 25V electrolytic
R1, R2	470Ω
F1	1A plus holder
LP1	Mains neon
S1	Mains switch d.p.d.t.
Two five-pin DIN sockets	

#### Monostable Oscillator:

IC16	74123
R1, R2	4.7kΩ
C1, C2	1000pF ceramic plate
VR1	10kΩ trimpot

#### Mains Locked Oscillator:

R1, R2, R7, R8	3.3kΩ
R3	5.6kΩ
R4, R9	10kΩ
R5, R6	330Ω
R10, R13	100Ω
R11, R12	560Ω
R14	1.8kΩ
R15	100Ω
VR1	1kΩ trimpot
C1	0.1μF polyester
C2, C3	0.01μF polyester
C4, C5	0.47μF polyester
C6, C7, C8	22μF/16V electrolytic
C9, C10	4,700pF ceramic plate
C11, C12	100μF/16V electrolytic
Tr1, Tr3 - Tr6	BC107 etc.
Tr2	2N3702 etc.
D1 - 4	1N4148

# Hot Pyes

*Les Lawry-Johns*

TIME after time we've noticed that if you get one awkward one in of one type you're bound to get half a dozen of them in a row. A little while ago we were plagued with Thorn 3500 chassis, one after the other, all awkward, nothing easy. Then came the Philips G8s, one after the other again until we cried out in anguish, enough, enough, let's have an end to it. The other day though it was the turn of the Pye group hybrid models – 691, 693 and 697 chassis, Pyes, Ekcos, Invictas, etc. Normally these sets are no trouble to us at all: one can usually put a couple of items in one coat pocket, a couple of tools in another and carry a soldering iron etc. to the scene of the crime in full knowledge that if the customer has described the symptoms correctly the job will be done in minutes. You know the sort of thing: picture went off, sound still o.k., a smell of burning (or saw smoke) and switched off (or the set went off completely as the fuse failed). The one or two items in this case would be a 100k $\Omega$  1W resistor, an 0.1 $\mu$ F 1kV capacitor and the usual fuses normally in the trouser pockets anyway.

## **The Stock Troubles**

Avid readers will have no trouble in identifying this common fault. The 0.1 $\mu$ F capacitor (C224) decouples the boost line feed to the c.r.t. first anode presets, coming via the 100k $\Omega$  resistor (R227). The capacitor shorts, the resistor cooks and the fault then becomes the same as if the 0.47 $\mu$ F boost capacitor has shorted, the difference being given in the description, i.e. smoke or a smell of burning which doesn't occur when the boost capacitor goes short-circuit because the PY500 immediately passes excess current and the fuse fails.

For the benefit of less avid readers, or if the symptoms have not first been properly described, the way to tackle the condition is as follows. Check the fuse. Connect an ohmmeter from the top cap of the PY500 (or PL509) to chassis. If there is a low reading (should be about 1M $\Omega$ , give or take a few hundred thousand – let's not be mean about this, say the needle moves on the  $\times 1$  scale or more likely swings over to give a definite reading) there is a short on the boost line. There are two likely conditions (lots of others, but two likely). One is that the 0.47 $\mu$ F boost capacitor C218 on the line output transformer assembly has shorted, the other that R227 has become a charred image of its former self due to C224 shorting, the 100k $\Omega$  now being more like something under 100 $\Omega$  (hence the unspecified movement or deflection on the low ohms range). The clue is in the appearance of the 100k $\Omega$  resistor. If it's clean and brightly showing its brown-black-yellow bands, suspect it not. Neither suspect C224 of course. Snip one end of C218 (the fat capacitor) and read again.

Ah, you may say. This is all very well, but where do we look for the 100k $\Omega$  resistor, to see if it is feeling poorly? Ah, we reply. It all depends. If the right side section is mainly a metal box, look underneath on a tag panel about half way between the PL509 and the PCF802 valve bases, with the 0.1 $\mu$ F capacitor laying along toward the shift controls (early models), or smack in the middle on later models (691). If the right side is occupied by a vertical printed panel

(later 697 chassis), note the top centre red box with the fuse inside. Look down the centre about a third of the way down, just above the transformer, and there it is, with C224 leading off to the right. All right?

## **Unstable Sound**

Well now, none of this applied to our row of Pyes, and more's the pity. The first one seemed simple enough to start with. No valves glowing. Early model, metal box on right side. Move it out to check the supply line. O.K. Check PY500 and PL509 heaters. O.K. Move the box unit back but fail to notice that the rubber sleeve has slipped down from the end of the focus unit (the e.h.t. end). Find break in heater circuit on left side colour-difference amplifier panel – crack in track to one of the PCL84 heater pins. Repair track. Valves light up. Lovely picture and sound. Sharp crack as e.h.t. discharges to convergence panel. Picture still o.k. Sound goes funny. Very slow motorboating, low sound clear, loud sound increases the rate of motorboating to make the effect garbled.

This could be due to an open-circuit electrolytic in the power unit or a fault in the audio module, possibly a faulty transistor. Check the easy thing first. Clip a high capacitance electrolytic across the supply to the module. No improvement. Fault must be in module.

Now the module in these earlier models is a Mullard LP1162. The most common complaint is failure of the output transistors. This cooks up the 2.2 $\Omega$  resistors which are connected between the emitters for bias purposes. Replacement is no joke, as we've mentioned before. Rush down to van and say unkind things to sleeping guard dog who continues sleeping. Rummage in spares box. Two modules. One used, one new. Rush up with both. Fit new one. Similar symptoms as before. What now? Don't know. Check this, that and the other. Remove front control panel again. Remove module again. Fit used one. Lovely clear sound. I hate modules. Make sure e.h.t. cannot discharge again. Carefully mark modules u/s.

## **No Signals**

Carry on to next set not too far away. Ekco with the 697 chassis. Varicap tuner. Raster and noise on screen, just as if aerial is disconnected. Aerial is disconnected. Plug in aerial. No change. Check tuning. Suspect loss of h.t. to the two 9.1k $\Omega$  resistors on top of the tuning panel (Fig. 1). H.T. present, and just over 30V at the TAA550 zener. Now what?

Remove tuner panel and check voltages. A.G.C. o.k. at A. +12V at B, nothing at C. This is where the tuning voltage should be. Check again and hold tuner steady. Tuning voltage o.k. at around 10V and lots more noise. Reach round and tune in sound and vision. I.F. unit on one knee, tuner on other, very uncomfortable. Let go of tuner. No tuning voltage, no sound only hiss. Move legs. Sharp point on i.f. panel penetrates trousers. Has to be 200V h.t. Move more quickly and wish I were dog in van. Examine tuner more carefully. Intermittent short to earth from tuner



This was a bit of a relief actually, because we've had our fair share of trouble with varicap tuners of various types. It's usually a faulty transistor or wires touching (just) the side wall, but we had one where the tuning voltage was lost due to a coil inside the screened compartment intermittently touching the wall of the compartment (lid soldered on).

So having restored normal signals and replaced the tuner and i.f. panel we thought we'd finished. No such luck. "While you're here," said the gaunt Mr. Moneypenny, "perhaps you'll clear a minor thing. The blue keeps going." I like this "minor" business. It implies that it won't take a moment, any fool could do it if he wasn't so busy, and of course it won't be worth charging for.

### ***Dealing with Weak Line Hold***

Now for the line hold. Always tricky on these sets, purely because of the vertical right side panel. The PCF802 line

Remove the side and top edge connectors, partly withdrawing the unit. Remove the cover of the line output transformer and the clip earth connectors. Remove the front PK headed 4BA screw which secures the e.h.t. tripler. Lower the panel. Components can now be seen. First check the 47k $\Omega$  flywheel sync circuit flyback pulse integrating resistor R203. If it looks discoloured or reads less than 47k $\Omega$  on the meter, change it. If it's much less than 47k $\Omega$ , check the discriminator diodes D40 and D41 which can suffer if R203 goes low. Remove one end of R210 (in series with the line hold control) and check its value (100k $\Omega$ ). If much less than 100k $\Omega$ , replace it. Even if it's not at fault now it soon will be and can cause other troubles. Then check the large 16 $\mu$ F electrolytic and the smaller 1 $\mu$ F and 4 $\mu$ F ones. These are C215, C213 and C210 respectively, in the line oscillator circuit. If these checks are inconclusive, change the PCF802 and the feedback capacitor C211 (320pF). This completes the normal checks.

## Explosions

Anyway, in walked Mr. Dawe. "Hallo Oven," we greeted him.

"How's the wife Jack?" I enquired. "Shelagh isn't it? Lovely girl! Went bang eh? I wonder why?"

"Rightho Jack, I'll follow you up just as soon as I've put a new mains dropper in this brand new set that I've just unpacked."

When we got there the poodle was running round in circles, apparently chasing his tail.

"Probably checking up to see that he's still all there" I suggested helpfully, being an expert on dogs.

190V HT via IF panel

9k1

9k1

30V

47

50

TAA550

002

Channel switch

Tuning potentiometer

Feed via AFC circuit on IF panel

0-28V

12V

Tuner

A

B

C

D

0.1

0.005

IF output

AGC

12V

D223

## TELEVISION JULY 1978



fuse and its connections are alive when the set is off, a point well worth bearing in mind.

When there's been a minor explosion, it's difficult to say exactly what the chain of events were. There's some molten copper and a blackened area. The idea is to clean up the panel, accepting the fact that there's been conduction across the panel between the tracks, the cause of the trouble in the first place rather than the failure of a component. First establish which tracks did which job (when they were there) and carefully wire up as neatly as possible, cutting away any remaining sections of conductive panel. Some confusion is possible, so the original circuitry must be kept clearly in mind.

There's another and very important factor. Some long thin tracks run down from the top edge connectors, near the area likely to have been damaged. Although they may have been intact at the time of the original trouble, subsequent handling of the panel may have extended any fine cracks farther across the paxolin, fracturing these tracks. This can lead for example to field collapse due to the 20V supply to the height control suddenly being lost. Careful examination can save an awful lot of trouble later.

Having patched the patient up nicely, the set was tried out. Picture rather dark at maximum brilliance. Fit new PL802. Plenty of brilliance. Convergence had wandered over the years, but responded to a few minor adjustments. All in all, not bad for four years' service.

Incidentally, the audio module is replaced by an i.c. on some of these 697 chassis, and there's a separate 1N4002 diode to supply the i.c. instead of the supply being derived from the bridge rectifier.

A further note may be necessary. We've outlined what happens when there's a breakdown of the panel insulation itself. This condition should not be confused with the type of blow out that occurs when the mains filter capacitor, wired across the on/off switch, goes short-circuit. This shatters the fuse of course, but can also damage the print beneath, discolouring a small area of the panel. If the panel itself isn't damaged but the tracks are, check the capacitor which will almost certainly be found shorted.

The next job was to seat the poodle in front of the set so that it could see that it wasn't going to go bang again. Being satisfied on this point, it no longer chased its tail or whatever it was. With the poodle straightened out we thought that a quiet five minutes would be in order. It wasn't.

### No Raster

A Pye 691 was apparently no longer entertaining its elderly owner. Off we went armed to the teeth, to wrestle with the final electronic cock up of the day. We won't bore you with the old girl: suffice it to say that she didn't stop nattering from the time we entered to the time we exited. The set however was a different matter.

The fuse had failed and there was a short from the top cap of the PY500 to chassis. Oh well we thought (as best we could against the old girl's incessant chatter), back to the old routine.

Turn up the unit to have a look at the resistors. We expected R227 (100k $\Omega$ ) to be charred – as mentioned earlier. It wasn't. Or rather they weren't. In fact the 100k $\Omega$  resistor had been replaced by two 56k $\Omega$  resistors in series, and these were obviously in the best of health. Looking around however we found the 100k $\Omega$  resistor (R210) to the line hold control burnt out instead. This made the look under the unit worthwhile after all.

Now whilst this could affect the h.t. supply to the line

oscillator, it wouldn't explain the boost line short which we foolishly attributed to the 0.47 $\mu$ F boost capacitor on the line output transformer. Having fitted a new 100k $\Omega$  resistor to the hold control, we were then stupid enough to remove the side panel of the transformer housing to expose the said capacitor, instead of checking something else first. Needless to say the 0.47 $\mu$ F capacitor proved innocent when disconnected at one end. Then the penny dropped.

Take out the PY500. No short then present. Heater-cathode short in the PY500 you stupid clot. Why didn't you check that first?

Well, if we had we wouldn't have found the duff 100k $\Omega$  resistor to the hold control. All right then, make excuses for yourself, after all it is getting late and the old girl is still on about her sister who died three years back.

Right then. New PY500, new fuse, no shorts. Switch on, lovely sound, real nice that sound. Wonder why the valves aren't lighting up? The sound which sounded so nice by the way wasn't really sound, just a nice loud hiss since the aerial was not in. Put the aerial in. No difference.

Wait a minute. Even if the valves were not lighting, that's nothing to do with the sound. It's not a 691! It's got a varicap tuner that needs h.t. dropped to supply the 30V for tuning. Quick check. No h.t. Now the old girl is on about her school days. Wish she'd stop for a moment so that I can think. Turn the power unit round. A.C. supply o.k. at one end of the surge limiter resistor, not at the other end. 5.6 $\Omega$  wirewound. Fit another. Try again. Sound o.k., news reader now competing with old girl.

Right. Why don't the valves light up? PY500 is getting heater supply and is new. What about the PL509? Open-circuit heater.

Oh dear, where's it all going to end? Fit new PL509. Heaters light. Allow time for set to warm up. Rustle of e.h.t. Can now see news reader. Not bad. Square up all round and wonder what the sequence of events must have been. Switch set off and wait for lady to stop going on about present day school standards. At last we manage to get our bit in and escape. Name on the cheque, Nightingale. Not very clever and logical was it? We do try to be but confusion usually sets in toward the end of the afternoon. Getting old.

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# Bubble, Bubble, Audio Trouble

Les Lawry-Johns

WHEN Mr Fortune smiled at me I knew I was in for an awkward one. He's an engaging Scot with a very dry sense of humour that leaves you wondering where the leg pull ends and the fact begins. You may remember his brother Dick (the Scot from New Zealand) who did so well at last year's sheep dog trials.

Anyway, Mr Fortune had a friend who had a Decca colour set which had been giving trouble with the sound, first going faint and then disappearing altogether.

"No bother" we said. "Bring it in and you'll be taking it out before you can say Hootsman".

## A Decca 20 Series

It came in all right. But it wasn't at all what we thought it would be. In the first place the model number didn't ring any bells. It was a CS2227 and was the first of these fairly old sets to come our way. We were quite unprepared for the audio output stage – a small panel up on the left side, containing the driver and output pair of transistors.

As there was no response at all from the loudspeaker we checked this first since it was freely accessible. A meter across the tags on the low ohms range showed no reading. With a smile matching that of Mr Fortune we removed the tags and connected them to a test speaker of some 15Ω. Still nothing, and the smile faded.

Recheck the speaker in the set. It now read 25Ω. Oh dear, I couldn't have connected the prods properly in the first place. Reconnecting the clips to their original place we turned our attention to the audio panel (Fig. 1).

It was easily removed. Still with the meter on the low ohms range we checked the npn output transistor Tr251. Base to collector about 30Ω, base to emitter the same. This one was o.k. then (bad mistake). The pnp transistor Tr252 was open-circuit base to emitter. This was it then.

Remove it from its heatsink and look up a likely replacement, which appeared to be a BC143. Fit this and switch on, having replaced the plug and flylead. Low, distorted sound. BC143 getting hot.

Check voltages. Full supply across BC143, no drop across the npn transistor Tr251. Penny dropped. Idiot. Failed to check it for shorts. Dead short emitter to collector. Remove and fit BC142. Check carefully, driver and diodes, small preset etc. All o.k. Refit and switch on. Burst of sound, then nothing. Oh dear (again).

Check voltages, all o.k. Still no sound. Connect test speaker. Lovely sound. Recheck set's speaker. Reads 50Ω and needle wanders up to infinity. Fit new speaker in cabinet. Sound now perfect. "All right?" we enquired.

Mr Fortune's friend shook his head sadly and said "Grrulley brunnesal yiggle frungle".

Mr Fortune interpreted for his friend. "The sound sounds fine but if you were round here you would appreciate that it's also helpful to have a picture to go with it. It was there but went when the sound came back, I suppose we mustn't expect too much. . . ."

With a heavy heart I became aware of a smell from the right side of the set. Tripler. Oh no.

"We'll leave it with you and call back later" said Mr Fortune. "My friend is getting impatient."

So saying, off went the jovial Scot with his friend now happily wagging his tail, leaving me with a smoking tripler which did little to sweeten the atmosphere of the shop.

## A Music Centre

Having finally cleared up the Decca, we thought we would tackle what appeared to be a straightforward job on a Ferguson music centre fitted with a Thorn 78S main deck. The complaint was no sound from either channel, though one side failed before the other. True to form, we did all the wrong things and reached (jumped to) conclusions and what have you which we had no right to reach or jump to.

Standing the thing up on its end, we released the necessary screws to enable the main panel to be removed for a quick look. Seeing a couple of burnt out resistors in one of the output stages we removed the supply plug and strip connector, plus the f.m. aerial plug to enable the unit to be separated completely.

The 315mA mains fuse had of course failed, and the burnt out resistors were the usual 2.2Ω (or thereabouts) ones which in this case join the collectors (see Fig. 2) of the output pair of pnp and npn transistors in one channel (four separate heatsinks). We assumed that there was a collector to emitter short and confirmed this with a meter check. Stupid to the last, and being distracted by the phone and enquiries about other jobs, we studiously fitted another pair of output transistors and collector resistors, stuck in a new fuse and coupled up. Smoke from the resistors, pop went the fuse. "You bloody fool, you forgot to check the drivers etc."

The same collector to emitter short was still there, but on removing the associated driver the short had gone and in fact the output transistors were not at fault, neither were the

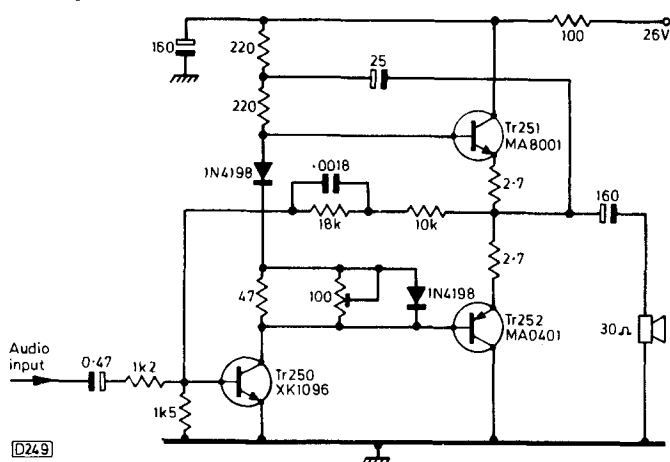


Fig. 1: The audio circuit used in some early Decca single-standard colour sets (20 series chassis). Most of the rest of the circuitry is similar to later versions of the Decca CTV25 series, though a different set of component reference numbers was used. Sets using this chassis are the CS2225, CS2227 and CS2520. Another difference is the use of an MC1351P intercarrier sound i.c.

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two previously removed. Looking at the circuit didn't really show how the resistors had cooked up as the result of one faulty driver, but a close check of the whole audio channel revealed that of all the six transistors and two diodes involved only the output pair and one diode were in fact in order.

Four new transistors and one diode were fitted and the channel then functioned fine (new resistors as well of course).

Turning our attention to the other channel we found that here only the a.f. amplifier and pre-driver transistors were defective, the effect of this being to turn the rest off (no burn ups). All this can be told in next to no time. In fact it took several hours, such is my blundering incompetence. I'll learn one day, you'll see.

#### Back to More Familiar Ground

You would think that after that repairing an Ultra colour set with a Thorn 3500 chassis in it would be a picnic. I thought so too, so I am barmy as well. Not half as barmy as the chap who introduced me to it however.

He came in and said "would you have time to come out to the car and have a look at my set so that you can give me an estimate for its repair?"

I replied of course "what sort of car radio is it?"

"It's not a car radio, it's an Ultra Bermuda colour television and it only wants an aerial socket. I've just brought it and don't want to spend too much on it. The people I got it from said it only wanted a socket, you see."

Here we go again, here we go again.

Reason prevailed and he and his dad got the set out of the car and on to the bench it went. It appeared to be in good condition generally, but I was not inclined to believe that the original owner would have parted with it simply because the aerial socket had broken. This however precluded it being demonstrated.

So while they stood there I fitted the required aerial socket. We then tried the set. Somewhat to my surprise, a picture of sorts appeared, but with very poor convergence. This partially responded to adjustment, but I was aware of some overheating from the convergence board. This sort of thing is usually associated with defective diodes, and it didn't take long to find that W571 was short-circuit. With this replaced and the controls reset, the picture was very reasonable and the tube seemed to have plenty of emission.

#### In Search of the Sound

We then went in search of the sound, of which there was no trace. The loudspeaker proved to be in order, but the voltages in the output stage were way out, as were those in the driver and audio amplifier stages (see Fig. 3). All four transistors appeared to read right in situ, but just to be sure each was removed and tested. The only one at all suspicious was the pnp output one VT404 which seemed to have very slight base to collector leakage though hardly enough to cause the wild voltage inaccuracy. To be certain this was replaced, but nothing seemed to change.

The trouble seemed to be that there was no turn-on voltage at the collector of VT401. This should be 0.5V in order to coax the driver VT402 into passing current. This meant that VT401 was shut off, either because its base voltage was too high or its emitter voltage was too low. We pointed an accusing finger at C402, which could have been short-circuit. It wasn't. The base circuit components seemed to be in order, so we concentrated on the emitter circuit.

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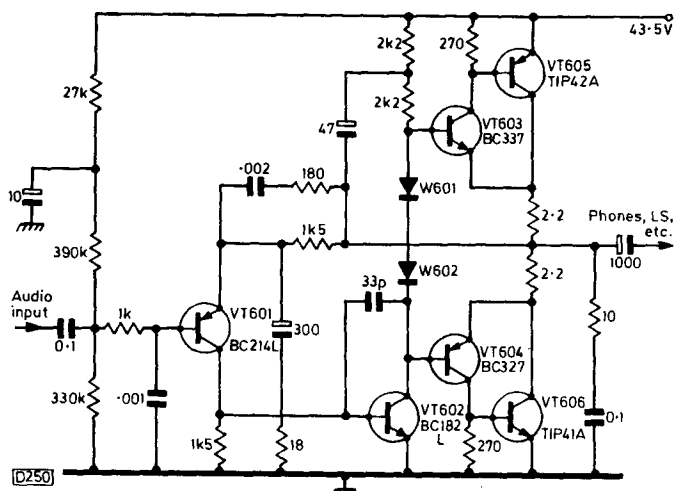


Fig. 2: Some contrasting audio circuitry, used in a Thorn music centre. One channel only of this stereo unit shown. Both channels were dead, for different reasons.

The voltage here wasn't too far out but on close inspection was somewhat lower than it should have been. This could have been due to leakage through C407. It wasn't.

Now stop and think. If VT401 wasn't passing current, there should be no voltage across R409 and there should be the same voltage at the emitter of VT401 as at the emitters of the output transistors. This latter voltage was not the correct 26V but more like 60V since VT404 was turned off. So the voltage at the emitter of VT401 should have been 60V instead of the nearly correct 26V or so! This could be explained if R409 was way up from its rated value of 4.7k $\Omega$ : it wasn't.

Panic started to creep in. The voltage at both ends of R409 was only about 26V and was varying slowly. Now this resistor is near the top of the board and quite suddenly the meter jumped and the sound returned only to fail as the prods were removed. Belatedly the penny dropped and panic was replaced by bitter hatred. Once again we'd missed the obvious. Very careful examination revealed a hair crack on the panel passing through two tracks. Scrape, clean and bridge with wire. Normal sound and correct voltages. At last.

## The Lot Went Off

Moving the set to make a final check on the picture there was a sparking noise and the lot went off, only to come back on immediately. What next?

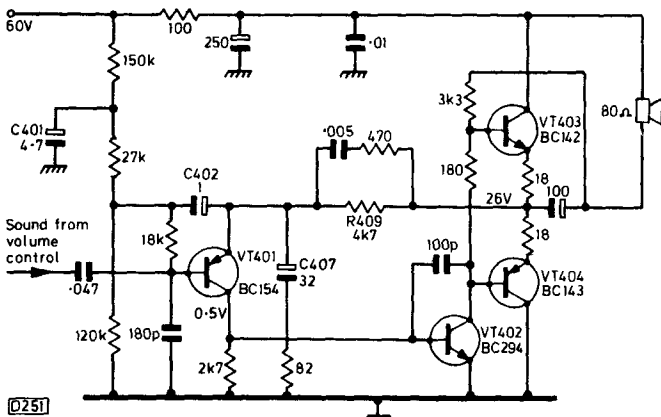


Fig. 3: Another collection of d.c.-coupled audio stages, this time the circuit used in the Thorn 3000/3500 colour chassis. Odd voltages were caused by printed panel defects rather than component failures.

We wearily turned our attention to this new problem. It turned out to be nothing more than a poor contact on the on/off switch, where the live mains lead had never been properly soldered to its tag.

Now the thing functioned properly. Now we knew why the set had been sold. All it wanted was an aerial socket.

## A Visit to Oaktree Drive

"Would you call to look at my set, it's the HMV, the picture's gone fuzzy? You know where we are, Oaktree Drive. Anytime". It was Dr Elmtree. So we wrote in the book Dr Oaktree, Elmtree Drive. Another 3500 chassis. Fuzzy picture. Probably means it's out of focus. Make sure we have a tripler in the outside service box. Yes. After tidying up a couple of loose ends we set off to attend to Dr er-who?

Now once the old computer has an address fed into it we are not really conscious of where we are driving until we get there, because thinking (as you may have gathered by now) is not one of our strong points. Arriving at our destination we were quite surprised to find it marked Oaktree Drive. Must have changed the name, we thought. Bashing on the solid oak door we were vaguely aware that there were too many oaks around to be true.

I was ushered into the room where the TV set lived by the elderly lady who had answered the door, but when I looked round she had vanished and in her place stood a stocky man who seemed to find something interesting in the ceiling. I thought I'd better attract his attention. "Dr Oaktree, I presume?"

He spoke. "Dr Elmtree is not here at present, I'm Dr Sideshow".

He said this still looking upward. I too looked up, in case there was something I was missing. He swivelled his eyes down to look at me, with his chin still held high.

"There's nothing to look at up there. I've only got my head up like this because there are two points sticking out of my collar which impale themselves in my neck if I lower my head. My wife has a habit of not taking the bones out of my collars before they're washed and ironed. Then when she finds the bones in a mess she takes them out and puts in cherry sticks. I wouldn't mind this but she forgets to break the points off and through the collar they go you see."

And off he went, struggling to undo the collar. What was that he'd said, Dr Elmtree? Could have sworn it was Oaktree. Perhaps I'm in the wrong house. No, there's the HMV. Oh well, there are some funny people about. Better have a look at the TV set.

Picture o.k. Suddenly bright blue and hazy. Not the tripler then. Just another one of those "reliable" thick-film resistor units crumbling up again (RGB output stage load resistors). Rummage in spares box and find three 8.2k $\Omega$  7W wirewounds which are near enough. Use with three 47k $\Omega$  carbon resistors (to chassis) to replace the thick-film colour drive output load resistive unit. Remove panel and spread out nearby *Girlie* magazine to catch any drops of solder. Easy job really, but some care is needed to insert the new resistors into the correct positions.

Ten minutes on panel, another ten studying *Girlie* magazine.

Not a bit like *Homes and Gardens*.

Wrap up job. No one at all around now. Let myself out having called out a few "hallos" up the stairs and into the kitchen. All the same if I'd been taken bad or electrocuted myself or something. Don't forget to send bill in, and try to get name and address right, Sideshow, eh?

# Odds and Ends

*Les Lawry-Johns*

QUITE often we come across slightly unusual faults during the servicing day (the nights are for sleeping these days, er, oh never mind). These snippets often go unrecorded, which is a pity because they could be of value to someone or other or could be of general interest.

## **No Picture, Buzz on Sound**

When Mr Dumpling brought in his Philips 210 we thought it would be another faulty line output transformer or shorted boost capacitor.

"There's no picture. The sound is o.k. except for a buzz." And off he went with Mrs Dumpling to get some shopping.

Taking the rear cover off and switching on, our attention was directed to the right side line output section and, allowing time for the set to warm up, we inserted our trusty neon through one of the holes in the screening cover between the two valves and were mildly surprised to see it light up to proclaim an operative line output section. Peeping through we could also see the glow of the DY802 e.h.t. rectifier. This meant that full e.h.t. — barring accidents — was being applied to the tube's final anode.

We then looked at the end of the tube, before taking tube base voltages, expecting that the first anode voltage at pin 3 would turn out to be absent. We didn't get that far however because the tube heater wasn't glowing. Since the tube heater is the final one in the chain, this could mean only that there was a short to chassis before the heater current could reach the tube. The alternative would be that the tube vacuum was lost, but if this had been the case there would have been fireworks from the final anode etc., and since the e.h.t. appeared to be o.k. this was not the case.

Which heater preceded that of the tube? The PCL82 audio output valve's. Of course, hence the buzz or hum. Out PCL82: you stand accused of having a heater-cathode short and probably damaging your cathode electrolytic if not your bias resistor. How say you?

The PCL82 admitted full guilt, and was sentenced to be detained in the waste bin awaiting the pleasure of the refuse collector (dustman). A check upon its bias resistor and capacitor showed no damage, so all that was required was a new valve and on came the tube heater with a good picture and hum-free sound.

Lucky Mr Dumpling.

## **Goosey Capacitors**

One thing about this place. We do have people coming in with lovely names. Like Mr Charge for example. Just close your eyes and you can see six hundred brave horsemen rushing into the valley of death. Guns to the right of 'em, guns to the left of 'em, on they charged to their doom and everlasting glory.

Mr Charge had the voice to go with it. Loud and incisive, no messing.

"I have a complaint to make," he boomed.

"Hallo Mr Charge" I greeted him, resisting the temptation to call his Dis. "Haven't seen you for a long time. Still rushing around I see."

"That set I bought from you, the damned thing's gone wrong."

My brows were just starting to knit together trying to think when we had sold him a set when his face broke into a smile.

"Fifteen years ago that was, my boy. Shouldn't have gone wrong as quick as that surely?"

It was true. Fifteen years ago we had sold him an Invicta 7007 as a second set. "We do apologise Mr Charge. Fancy it letting you down like that. Can't rely on anything, can you?"

Now the 7007 was one of the first dual-standard sets to emerge from the Pye group, being a Pye V700D in a white ivory plastic case. By and large these nice little sets have had their fair crop of troubles, mainly droppers, valves and the like, but this one had never required attention, probably due to only occasional use. Apparently Mr Charge now wanted to give it to a maiden aunt but found that on trying it out there was severe lack of height etc. The weak link on these sets, developing as the years go by, is leakage in the waxed paper capacitors, mainly in the field timebase. This could possibly be aggravated by their close proximity to the e.h.t. cap. Longer capacitors cannot be used as they would actually touch the cap. As it was, those fitted looked a sorry sight, the brown wax severely blackened, with spikes of goo sticking toward the e.h.t. cap.

In the event every one of the capacitors of this type, of which there are about seven in the field timebase, recorded leakage. They are not particularly easy to replace. Whilst this tedious job restored normal field scan, the sync was very poor, both field and line, leading us up to the top centre panel where the 0.1 $\mu$ F sync coupler C89, of the same type, was also leaky. This cleared up the poor sync, but for good measure we checked up on other capacitors of the same construction. Every one showed leakage to some degree. It was well worth the effort however, as the tube was as good as new.

## **Tuning Troubles**

We've had a fair number of the nice little ITT portables (VC300 chassis) in for service and few have caused us much heartache. One did however.

Normally the complaint is that the picture is distorted, with a severe hum bar, or that this develops after a short time. The bridge rectifier is usually responsible and replacement with a more reliable type presents little difficulty.

Some time ago however one came in with the complaint that the signals would be intermittently lost, leaving plenty of noise on the screen and sound.

It didn't take long to find that the tuning voltage (Mullard ELC1043 varicap tuner) at the 32V end of the 8.2k $\Omega$  supply resistor R3 (see Fig. 1) was varying, although the 90V end (derived from the line output stage) was steady. The resistor appeared to be o.k., so we suspected the zener IC1 of not zenering. This proved to be correct, a TAA550 sorting that one out. Upon inspection however the 12V mixer supply resistor R28A seemed to be in danger of

coming apart, so this was replaced for good measure. On test the set behaved itself for a couple of hours. It was duly wrapped up therefore and later collected.

After a week it was back. "Same thing," he said.

We checked on what we had done but found no fault. On test the little fellow behaved faultlessly for hours on end.

Again it was collected, and we explained that we could not fault it. A week later, back it came. "Same thing," he said.

On test it worked all right for some time, then suddenly the picture became very grainy and faint and the sound hissy.

This was not the same at all. So we turned our attention to the main board, where the tuner lived (the tuner voltage selectors etc. are on a separate panel with the bridge rectifier, fuses etc.). The slightest touch on the panel in the vicinity of the tuner restored normal reception, and at first it appeared as though the aerial input cable to the tuner was at fault. Not so.

The voltages applied to the tuner were correct and remained so. We've known similar symptoms to be caused by faulty panel connections to the first i.f. stage: this avenue was explored since although the tuner was suspect the customer would probably not expect any further charge as he considered that the original fault was still present – and a new tuner would have to be chargeable. As the probing continued it became possible to bring on the fault condition almost at will, now by applying pressure to the tuner although this had not been the case earlier.

We removed the tuner from the panel and inspected it closely on the bench. This failed to show up any shorts, and the transistors read right. This time we fitted the tuner back minus its side panels and took voltage readings.

When the fault was present there was no voltage supply to the r.f. amplifier section of the tuner. The track which feeds this section runs along the top of the tuner panel from the mixer stage, where the voltage was present. Whilst there was no visible break in the track, a wire connected along its length restored permanent operation. Due to the proximity of the peripheral components, the tuner had to be removed once more to fit its side covers.

### Mishetsfaulty

Deeply sun tanned, he carried the ITT CVC8 in as though it was a toy.

"Just got back from the Gulf and the telly's popped off. Can I pick it up later on?"

"Certainly Percy" we assured him. "Leave it a couple of hours and we'll have a quick shufti."

"KataKerrack mate," he thanked me. "Shufti inter bardine."

I didn't know then that when I did see him later he would be considerably the worse for wear.

The set itself was no trouble. Blown line timebase supply fuse due to a shorted 0.47 $\mu$ F 1kV boost capacitor. In they went and the set was as right as ninepence in no time at all.

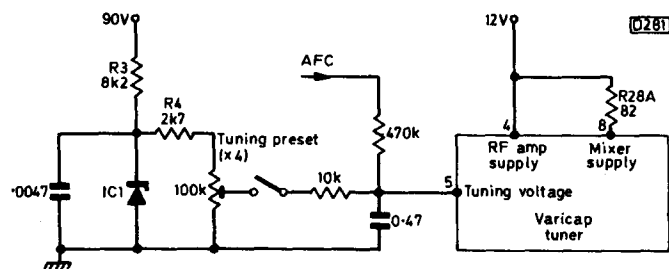


Fig. 1: Varicap tuner supplies, ITT VC300 chassis.

Which is more than we can say about Percy when he came back.

"Ish my shet ready?" he enquired boozily. "I've been up the club wish my mates. Haven't had a good drinkinmums. Goinbackther inaminit." He saw the worried look upon my face.

"I'm all right," he proclaimed. "I'll jush puththesetinthecar." "I'll put it in for you and I'll drive you home" I said firmly.

He held up a large hand. "Stannaswire, my friend. I'm not drunk." Whereupon he picked up the set and staggered to the door.

"Don't worry about me mate" he bawled. "I'm as sure footed as a mountain goat."

Funny sort of goat. More like a beserk bear I would have said, as he fell on to one knee and the set went crash on its end.

"Oh dear, oh dear," mumbled Percy. "I've gone and dropped it."

So back on the bench went the set and Percy ambled off, promising to return later when he felt better.

When the set was tried it appeared to function all right except that the sync was lost. Bearing in mind the sudden blow it had been dealt, we concentrated on connections rather than components. Nothing appeared to be adrift between the large left side and smaller lower centre panels however.

Much time was lost until we tried a lead made up with a crocodile clip at each end, connecting one end to the main frame and the other to an earthy bit of the print around the centre of the lower centre panel. This restored normal working, so we then had to follow the tracks around, remaking anything suspicious and for good measure using the heavy Weller iron to remake the main frame tabs to the board. After this everything was straightened out and on test the set performed well until we helped a sober and subdued Percy to put it into his car.

### Another ITT Hybrid

After this it was inevitable that the next set would be another ITT one of the same ilk (hybrid CVC5 variety).

In waltzed this pretty little thing, smallish with all the curves in the right places for a few short years, depending on the diet later. For now she was a picture. Lots of personality, bubbling over with fun and confidence.

"My boyfriend said you would take care of me" she bubbled coquettishly. "Our TV won't go and mum and I do depend on it when we haven't much on in the evening."

Senile decay dropped from me like a cloak falling from an unveiled statue, revealing the drooling wolf that lurks in all of us.

"I'll pop round to have a look at it, say ten or eleven this evening?"

She gurgled with laughter. "Isn't that nice of you. Actually it's in the car though. Gerald put it in before he went to work this morning."

This stumped me for a duck. She must have a very modern mother. I whipped over the pad. "Could I have the name, address and telephone number please," I asked. "For the records you know."

"The name is Take." "Mum and I live at 29 Spring Lane, but the 'phone hasn't been connected yet as we've only just moved in."

So I wrote on my job pad: Miss Take ITT.

I'll spare you the rest of the dialogue. Anyway, Gerald would collect it later. Off she trotted, taking her sparkling eyes, teeth and hair with her. Oh what it is to be young and sure that the world is your oyster.

So to the set. What a mess. Again no sync and the convergence was so far out that it didn't need a picture to tell you so. With the previous set in mind we checked the earthing on the lower centre panel etc. Nothing doing. It was evident however that this panel had suffered some damage in the past and had been patched up. Carefully checking around the sync separator section seemed to produce one or two things that didn't add up, so we removed the sync separator transistor to enable us to measure the associated components more accurately.

The transistor taken out should have been a BF117. It was a BC142, which has a much lower voltage rating, but was perfectly in order. With this out however we were able to measure the  $3.3\text{M}\Omega$  collector-to-base bias resistor which proved to be high. Replacing this and the BF117 restored some semblance of lock, although both the line and field timebases took time to settle down. To cure this necessitated a new PCL805 and PCF802, and we were then left with the severe misconvergence.

Viewing the three separate rasters with some trepidation,

we first set the static magnets to get them somewhere near correct. In seconds the convergence was perfect all over, only the static needing adjustment. Lucky me. But why? I wonder if Percy knows Miss Take?

### Pye 725/731 Chassis

Just for the record (again), the Pye 725 chassis seems to be showing its weaknesses. One or two are: the focus unit, which goes up in flames; the  $0.1\mu\text{F}$   $1.25\text{kV}$  capacitor C563 across which the c.r.t. first anode supply is developed – it's above the line output transformer and behind the focus unit; and of course the inevitable mains filter capacitor ( $0.22\mu\text{F}$ , C915) which shatters the  $3.15\text{AT}$  mains fuse. By the way, was it really necessary to insert the two screws which secure the front end of the line output transformer cover so tightly, and couldn't the cover have had the screws at the rear and the clips at the front, just to make things a bit easier? C563 goes short-circuit, overloading the line output stage with the result that the h.t. fuse F971 (1A) blows.

## Letters

### LACK OF HEIGHT

In *Your Problems Solved* in the July issue the problem of lack of height with the Thorn 1590/1/3 series of monochrome portables came up. I've had considerable experience of dealing with these sets, and have found that the usual cause of this condition in practice is either variation in the value of R86 which is in series with the height control, or the flyback diode W5 becoming leaky. – P. F. Bardsley, Stalybridge, Cheshire.

### COMMON-EMITTER VARIANT

I've found the series on *Transistors in TV Circuits* very interesting but would like to query the account of the bootstrap arrangement in the field driver/class B output stage given in the June issue, where it's stated that both stages are common-emitter circuits. One of the properties of a common-emitter circuit is that there is a  $180^\circ$  phase reversal between the input and output. But in this case – see Fig. 1(a) – the a.c. voltages at the inputs (bases) of the complementary output transistors TR2/3 are in phase with the output which is taken from the emitters, with the collectors grounded, i.e. the circuit is an emitter-follower.

S. W. Amos goes on to say that if this were so "a very large voltage swing" would be required to drive the bases. Surely this is in fact the case, since bootstrapping the driver's collector load (R1) means that the a.c. voltage at the top of this resistor is in phase with that at its lower end so that the driver "sees" a much higher load impedance than the actual resistor value, thus allowing a large voltage gain to be obtained.

The two output transistors then match this high impedance to the low impedance of the scan coils, providing current gain with negligible voltage loss, which of course is one of the advantages of using an emitter-follower.

The output transistors could in fact be considered to be voltage driven. If they were mainly current driven as suggested, the bias resistor R3/4 might need to be bypassed to a.c. since there would otherwise be a considerable voltage drop across it due to the potential-divider effect of the

resistor itself and the input impedance of the upper, npn transistor in parallel with the load resistor. The high input impedance of an emitter-follower plus the apparently high value of the driver's collector load resistor means that this voltage is negligible however so that a bypass capacitor is unnecessary. – R. Wallace, Teignmouth, Devon.

*S. W. Amos comments:* R. Wallace is correct in saying that the input and output signals of a common-emitter amplifier are in antiphase – but only when the output is taken from the collector circuit as shown in Fig. 1(b). If the output is taken from the emitter circuit as in Fig. 1(a) and (c) the output signal is in phase with the input signal. Fig. 1(c) is probably a better way of showing a common-emitter circuit than the usual way – Fig. 1(b) – because it's so clear that the emitter terminal is common to the input and output circuits. Perhaps my explanation of the circuit's behaviour would have been clearer had I said "if TR2 and TR3 were emitter-followers their high input resistance would have made it difficult for TR1 to drive adequate current into them. In fact the voltage drop across R1 would probably have equalled the supply voltage before full output was obtained from the amplifier. But by making TR2 and TR3 into common-emitter stages their input resistance is reduced to a value at which TR1 can supply the input current with ease and the voltage developed across R1 and the input of TR2 and TR3 would be only a fraction of the supply voltage even when the amplifier is delivering maximum output."

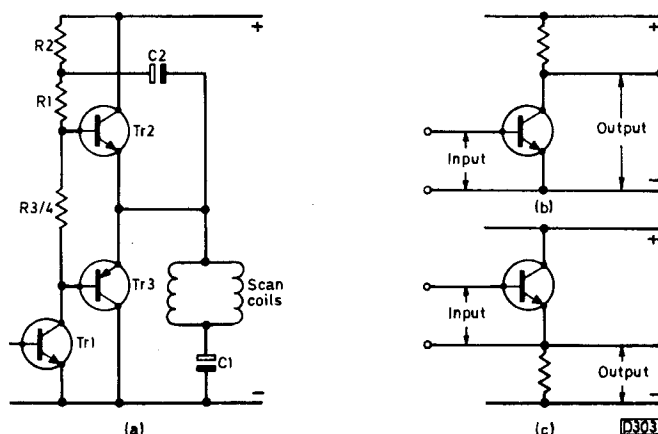


Fig. 1: Common-emitter or emitter-follower circuit?



# Never Knock a Neck

*Les Lawry-Johns*

I didn't like the look of them from the moment they walked in. She was short and fat and an ignoramous to boot. He was short and lean with a pinched look and another ignoramous to complete the pair.

## *The Saga of Grace and Sid*

"If we bring our set in and tell you what's wrong with it, will you put a picture valve in?" she demanded. Before I could think up a telling reply, he staggered in with an ageing dual-standard Bush.

Breaking off the conversation I'd been having with the cat, I surveyed the wreck with a pessimistic eye. "Getting on a bit, isn't it? Think it's worth doing?"

"That's a good set that is," said the self-elected female spokesperson. "It only wants a picture valve."

Having been a coward all my life, particularly when faced with a loud mouthed woman, I connected the set to the mains and stuck an aerial in the socket.

The sound came on reasonably well, but after a long delay all that appeared on the screen was a very very dim raster which did not respond to the brightness. Obviously the tube. Just to confirm this I took the back off and checked the tube base voltages. All correct, grid swinging with the brightness control setting, but with no effect on the dim raster.

I told them that all the valves in the world wouldn't help and that the tube was at fault.

"How can it be the tube?" said the brain of Britain. "There was a lovely picture on it last night, wasn't there Sid?"

"I can't see it being the tube," Sid said dutifully. "Lovely picture last night, just like Grace said."

"Well there ain't no picture on it now," I bawled. "The tube's clapped. Finished. Bugged it is." So saying I tapped the neck of the tube with the handle of a screwdriver.

A nice flash of black and white picture appeared for a split second, then relapsed back to the dim raster as before.

"Do that again," said Sid. "I saw something come on there, there must be something loose."

"Loose, loose, of course it's loose. It's loose inside the tube you twit. Look." I gave the neck another clout. On came the picture in a brief flash, then off it went again.

"Well," said Grace. "That won't cost much to put right, a little thing like that. We'll go up to two pound but no more."

"Oh yes, two pounds all right," pronounced Sid.

That was enough for me. On went the back, out came the aerial, off went the mains. "Sorry, perhaps you ought to get a second opinion. It's beyond me."

"You mean you're not going to do it?" Grace quivered with indignation.

"No I'm not and that's that."

So off they went with lots of uncomplimentary remarks clouding the air as they left.

Later that day they stalked in again.

"We came back to tell you you don't know anything about television sets. There's nothing wrong with that tube. Tell him Sid."

"You nearly made me throw that set away," moaned Sid. "But I took the back off and just cleaned the dust off from under that rubber cap on the side of the tube and the picture is perfect. And I don't know anything about 'em."

"I do," said Grace. "I used to work in a TV factory and I'm telling you the tube ain't gone. You didn't ought to be 'ere you didn't."

Lots more was said before they went.

My fault of course. I shouldn't have knocked the neck.

I wonder what they said later when it reverted to the open-circuit condition again and there was no more dust to wipe off. I'll never know.

## *Troubles with a VC300*

Kevin came in. He's done quite a few good turns for me in the past, so when he brought in a small ITT Featherlite VC300 which was worrying him I didn't hesitate to take the repair off his hands. The first symptom was field collapse, but the resultant white line was wriggling a bit. So we attacked the field circuit first, and quickly found one of the output transistors (T11, TIS91) open-circuit. In went another and the scan opened up, but with an undulating raster which proclaimed a nasty hum on the main 11V line. This was due to the mains bridge rectifier of course, and another went in without much ado.

This left a clear picture except for a few random flyback lines which appeared to move about the screen as though the sync was about to be lost and the picture about to roll, which it didn't and the field lock was very firm.

Flyback suppression, I mumbled to myself. Now although we've serviced these sets time and again, we were not familiar with the flyback suppression circuit and it was a bit irritating to observe that the lines would vanish for minutes at a time and then reappear, particularly if the panel was disturbed. This prompted us to diagnose (wrongly) a dry-joint or the like. Some time was spent chasing around from the field timebase to the blanking transistor T5.

At last we changed this (using a BF337 as a substitute), and were rewarded with a clear picture which lasted for about fifteen minutes before the picture became impossibly grainy with hissy sound. Back on familiar ground unfortunately. Check aerial socket, cable to tuner, remove tuner from panel. Take off covers. Put tuner back, check voltages. First stage transistor emitter voltage wrong and varying. Trace to where the emitter resistor is returned to earth via a screening peg. Nice crack around peg. Resolder. O.K.

Remove tuner, refit covers and put tuner back. No more trouble. Thanks Kev. With friends like you I don't need enemies.

## *Taffy's Turntable*

We thought you might like to hear this one. We were asked to call to attend to a radiogram which had the complaint that although the radio section worked the turntable would not turn. We left it until there was another

call in the area and then popped in to see old Taffy.

"What's wrong Taff?" Taffy growled and gurgled as was his wont (he'd had a few during the lunch hour) so we decided to find out ourselves.

Usually this type of BSR changer grinds to a halt due to old, thick grease on the centre spindle. This stops the motor rotating, which it doesn't like and is thereafter reluctant to spin again even when completely free. It has to be spun a few times with perhaps a spot of oil on the top bearing until it gets its magnetism sorted out when it will then start up on its own. The turntable did indeed seem to be stuck fast on the centre spindle. Having freed it and lifted it off we were prepared to clean the centre spindle and the turntable bush, and lightly oil them. We were not prepared for what we found however. There was no motor fitted.

"Taff, Taff. Are you there Taff?"

"Whassermatchure, woswrong?"

"There's no motor in your radiogram Taff."

"No motor, no motor. Wodyoumean no motor? Theremusbe one. The radio's been going all morning. Matter of fact" – as his head cleared he climbed on his dignity – "matter of fact the thing's been working for six months on Radio Two. Never shift it."

"You don't need the motor to work the radio Taff. It only turns the records round."

"You'll have to ask the wife about that. She looks after all that sort of thing. She fixed it some time ago when the music was going slow. The music has been all right since but I haven't played any records you see."

"Is the wife around Taff?"

"No, she's in Finland. She sent me this greetings record but I can't play it because it won't go round. That's why I asked you to call."

Back to square one.

Feeling somewhat baffled, I went back to the radiogram and Taff wandered off to another room, grumbling to himself. Removing the rear cover of the gram, we found the motor on the floor of the cabinet, still with its leads connected. Switching on the juice made the motor buzz, but it wouldn't go round. Applying a drop of oil to the top bearing and raising the spindle up and down a few times seemed to free it off. Spinning it by hand helped it to start and away it went after that on its own. A careful search also located the three circlips which hold the motor fixings on top of the rubber bushes, so back the lot went and having cleaned off the centre spindle and bush the turntable spun freely.

"O.K. now Taff. Where's the record the wife sent you?"

In came Taff. Mumble, mumble. Eventually he found it. His wife's message was loud and clear. After the first greeting, she said. "You'll have to get the gram done before you can play this. Tell the man that the motor is underneath because I couldn't get the clips back and it won't go round anyway."

Taff gave me a baleful look. "If you'd played that before you started, you'd have known where the motor was." I quit.

### **Distorted Picture**

The next call was nearby. I wish I hadn't bothered. It was yet another Pye 691 hybrid colour set.

The complaint was a distorted picture. Folded up from the bottom, then widespaced lines up to two thirds, then a bright kink, then severe compression up to the top.

The owner sat at the table and gave me his advice.

"It won't take long to do. The last chap fixed it in a couple of minutes with a screwdriver. I suppose it'll take

you longer if you're not used to the set."

"Why didn't you get him to come back and do it again?"

"He doesn't do them now. He gave me your phone number, so I thought I'd give you a chance if you're just starting up."

Off came the back cover. The field output transistors were the older BD124 types on the horizontal heatsink. Check these. Apparently in order. Check the AC128 driver transistor. Again o.k. Check resistors, o.k. Check electrolytics in turn, disconnecting each first. All had capacitance, none showed any significant leakage. Legs aching, panic setting in. No spare panel, no service manual. Check diodes, o.k. All supply voltages present and mid reading on BD124s not far out. Try presets. Produce weird effects but nothing of any value. Could be on convergence panel? Some messy work had been done here. Give up.

"Sorry, it'll have to go back to the workshop."

He sat at the table and drummed it with his fingers. "The last chap said it would need a panel before long. Have you got one?"

"Yes, but I'm not sure that's the answer."

"Can I have it back for tonight? – it's not much fun looking at the portable."

*"It's not much fun sorting this out either!"*

So load the thing into the waggon and take it back to the shop. Back at the ranch there were lots of other things to sort out but we finally got on to the Pye. Try another field panel. No joy. Open up the convergence panel and make good scorched connections, poor pots and dry joints. Check electrolytics. No joy.

Check continuity of circuit from field panel to convergence and to scanning assembly. All o.k. ... Scanning assembly ... Oh no! Try to check windings and thermistor. Not conclusive, only confusing.

Lady wants leads soldered on to transistor radio battery box which is falling to pieces anyway. Fit new box and connectors. Back to Pye.

Have we got a spare scanning assembly? Yes. Strip off tube base, blue lateral, convergence assembly and scan coils. Fit new coils, connect up but can't find one lead. Finally find it jammed up behind front of new assembly. Check connections, refit convergence, blue lateral assembly and base socket. Won't go on properly. One tube pin bent. Get it on.

Make sure all is in order. Switch on. Joy at last. Set up and converge. Return set to owner.

"Picture's not as bright as it was before you took it." Fit new PL802. No picture at all. Remove CDA panel and make good deteriorated soldering and small cracks around PL802. Nice bright picture.

"How much?! You blokes must be making a fortune at this job."

### **No Signals**

I thought I'd make an early start the following afternoon, as I'd an uneasy feeling that things were not going to be plain sailing. Four colour sets and one mono, no two the same (for a change).

We made the nearest one the first call. This turned out to be Mr. Peacock's Dynatron. The Pye group chassis fitted was a 697. No picture, no sound except a loud hissing noise. That was Mr. Peacock's description. Bright as a new pin we first made sure that the aerial plug was in. It was.

Take the back off. Wave a neon over the line output section. Lights up, plenty of juice over that side. Check h.t. on CDA panel. None except at supply plug and socket on the right side of panel. Easy. Remove panel and note nasty

black mark round track from socket. Clean up and jump a lead from the socket to the nearest relevant solder blob. Assemble and clip up. Switch on.

Sound o.k. Picture arrives after a time. Tune in after battle with remote control and receiver buttons. No colour. Check here, there and everywhere (Mr. Peacock watching). Find plug out of decoder panel, probably caused by upending CDA panel. Refit plug. Colour returns to screen and to my cheeks. Mr. Peacock was looking mystified.

"I thought the sound side was all transistor" he said.

"It is."

"Well, when you were checking with your meter, why did you mutter to yourself about no h.t. I always thought transistors could work on low voltage."

Oh Gowd, I thought. Here we go again.

"The transistors were being supplied. That's why they were hissing at us. But the tuner wasn't tuning you see."

"Oh I see. The tuner needs h.t. Fancy that."

I was in a hurry so I didn't go on any further and left him thinking that tuner transistors must be pretty hefty devices.

### **Very Dark Picture**

The next call wasn't far away. This was to a Ferguson set with a 3500 chassis. I was only praying that the tripler hadn't gone and bugged up the e.h.t. transformer, which appears to be our lot of late. Mrs. Dewdrop answered the door.

"Hallo Les," she greeted me.

"Hallo Dorothy, doing some decorating I see."

"Yes, I hang one strip of paper per day so I don't get bored with it." It takes all sorts to make a world, but that's about the daftest thing I've heard for a long time. It's not my business however and I wasn't going to ask what she did the rest of the day.

So we attacked the TV. In fact there was a very dark picture in the background, so the tripler was o.k. after all.

A dark picture on a 3500 means that the beam limiter should be the first item to receive attention. R907 (1.5Ω) should have about 1.5V across it (manual states 1.3V). If the voltage is higher, the brightness is backed off. The line timebase current flows through this resistor to earth so the resistor monitors the line output stage current and, if the circuit is not defective, it limits the beam current.

The voltage across R907 read over 3V, so there was either excess current flowing due to a fault in the line output stage or the resistor was not all that it should be. The dark picture seemed to be of the right size, and the c.r.t. first anode voltages on the convergence board were well up.

So we switched off and measured the 1.5Ω resistor which read 3Ω. We'd thoughtfully put a packet of 1.5Ω wirewounds in the box (spares box, not the TV) so it didn't take long to put a new one in. The voltage was now nearly 2V, which was still high. Checking around showed no faults, and the picture was good with plenty of brightness. So we didn't argue with it. By this time Dorothy had hung her daily strip, so all work was now complete.

### **Smoking Bush**

Off we went to the next set, a Bush monochrome one that had smoked. It was an elderly dual-standard 23in. receiver (TV148 series).

Investigation showed that one of the h.t. feed resistors on the left side lower electrolytic block had been cooking. This was 3R59, 3.3kΩ. It feeds one lead over to the timebase panel, another over to the receiver unit. There was a low resistance reading to earth, and unplugging the leads proved

that the short was on the receiver unit. So we disconnected the system switch and swung down the chassis in order to peer behind it with the aid of our little torch. The tracks lead off here and there, but a close look on the component side revealed a blackened disc ceramic. Snip, snip and out it came. No short. In went another disc with the right voltage on it but the capacitance somewhat smudged. Swing up chassis. Make sure plugs are in and system switch is in 625-line position.

Switch on. Nice noisy raster, lovely rushing noise on sound. Plug in aerial. Push in buttons. Nothing to speak of at all. Check that aerial is in u.h.f. socket, ignore the three buttons which give whistle (who wants 405?). Finally tune in terrible picture. Oh dear. Surely the smudgy disc capacitor couldn't do this?

Call Mr. Latterly who assures me that the picture was good before the smoke. Then he noticed what I was trying to tune in. It was a BBC-2 test card.

"We never get BBC-2."

Wearily I plugged the aerial into the v.h.f. socket and selected the other buttons for 405. Bright BBC-1, not bad ITV.

"That's more like it. Did you think we had a BBC-2 aerial?"

### **Intermittent Colour**

Feeling a little tattered we moved on to the next casualty, which we confidently thought to be a 3000 chassis HMV. On turning it round and seeing the row of knobs on the left side realisation burst. It was a 2000 chassis, and since the complaint was no colour I was frightened. This was mainly because we don't meet many 2000 chassis, and those we do meet generally need only power components – zeners, wire wounds etc.

The lady of the house refreshed my memory of the complaint. No colour for some time and then it tries to come in and sometimes does, but never right away.

"Is there anything I can get you?" she asked solicitously.

"Do you think I could have a mirror and a hairdryer?"

She looked at me and my hair. "It does look a little rough, but do you think this is the right time to do something about it?" she ventured.

I combed my hair viciously. "I need them for the set, not for me. The dryer to warm things up a bit and the mirror to see when the colour comes in."

She went out and I remembered that I had a dryer in the spares box in the van. This was just as well because when she came back she was wheeling an enormous hooded affair on a stand.

She did however have a suitable mirror, so with this propped up in the right position and my dryer blowing away like made we were ready to attack the enemy.

The decoder board is at the bottom centre and we carefully covered the suspect areas with hot heat. Chrominance amplifiers, colour killer and reference oscillator, nothing escaped our ruthless scorched earth policy. It didn't do much good though, except for occasional half-hearted bursts now and again.

I tried to be clinical, though this never really comes off. Remove panel in its entirety and examine closely. So we unplugged the plugs and removed the board. We looked and looked, checked here and there and finally pronounced our judgement: "buggered if I know."

So back went the panel, in went the plugs and on went the set. Glorious colour. Considering the age of the tube, it was well nigh perfect. A tweak up on the gray scale and nothing was left to be desired.

"Aren't you clever," said Mrs. Post.

"I suppose I am really" I admitted.

"What was wrong then?"

"Er, there was apparently an intermittency in the chrominance interconnecting connections you see."

"You mean a poor connection."

"Yes, I suppose you could say that."

"And the hairdryer found it?"

"Er, no. It might have done but it didn't. Perhaps it will next time." So off we went again. So much for the 2000. Kids' stuff really. Sets like that don't frighten me.

### **Ah Doric, I Knew Him Well**

Which left one. Ah Doric, I knew him well.

As a matter of fact it was the first time one of these sets had come my way. I'd no servicing information on it, which doesn't make a lot of difference because I have great difficulty in reading anything anyway. I always seem to try to do things first and then have a go at reading the instructions afterwards. The owner however had a complete manual, which was presented to him when he retired from his firm a couple of years ago - together with the set of course.

I was amazed to find the imposing looking set in front of the window, with the coaxial cable connected to a small set-top aerial which was perched in the centre of the carpet.

"Do you always have the aerial there?" I asked.

"Most of the time," he said. "Except when we want BBC-2 when we put it on top of the set."

The reception area wasn't all that good, and it seemed a clear cut case of spoiling the ship for a hap'th of tar. Our's is not to reason why however.

Apparently the picture would completely lose it's "body" after an unspecified period, becoming a sort of plastic near negative with only some colour noise in the background.

Without consulting the manual, this suggested an i.c. or transistor failure somewhere between the detector and the splitting point of the luminance and chrominance signals. Wherever that was.

So we consulted the manual and got involved with an "SF" panel which we eventually found wasn't there (only on cable receivers it said). We had another go and found the relevant panel for "aerial" receivers, ending up on the top of the decoder panel around some likely looking BC148s.

Since the picture was acceptable at that moment, the voltages tallied with those given in the manual. When the "plastic" condition occurred, the voltages on one went haywire.

Consulting the circuit again we found that this was d.c. coupled to the preceding one which was reading right. So the d.c. coupling wasn't.

In fact the coupling agent was the luminance delay line so we hadn't got our diagnosis right in the first place. The one thing we didn't have with us was a luminance delay line, but to prove the point we jumped a lead across the suspect one and the picture stayed on and the voltage remained right. We expected a degraded colour picture, but it was as good as it had ever been with the aerial in the centre of the carpet (what's a ghost or two when you already had three!)

We told Mr. Sparerib that we would be back with a delay line later, but that he wouldn't notice the difference until he had a better aerial.

So back to the workshop, to the turntables that won't turn, the auto-ejects that won't eject, the cartridge player that went bang and the telly's which won't tell.

# next month in

# TELEVISION

## ● ELIMINATING GHOSTS

One of the most trying reception problems is ghosting, the reception of reflected signals that don't coincide with the direct one. Apart from giving an unacceptable picture, ghosts play havoc with teletext signals. There are various ways of alleviating the problem, but a certain amount of experiment is usually necessary. The best solution is the use of adjustable stacked arrays. Bill Wright explains how to go about this.

## ● VERSATILE REMOTE CONTROL SYSTEM

Plessey's latest remote control system is claimed to be the most versatile yet, using two purpose-designed i.c.s. Pulse-position modulation is used to provide high rejection of spurious signals and thus error-free operation. The signals can be transmitted via either an ultraviolet or an infra-red link. The system can be adopted for other purposes as well.

## ● FAULTS ON THE 9000 CHASSIS

In 1975 Thorn once again startled the TV industry with the introduction of the 9000 colour chassis with its Syclops combined chopper regulator/line output stage. John Coombes provides a summary of faults and servicing hints based on three years' experience of the chassis.

## ● VARICAP TUNER CHANNEL DISPLAY

Alan Damper describes a novel circuit using LEDs to show which channel has been selected by a varicap tuner. An incidental advantage is that maximum brightness corresponds to correct tuning. The system is useful mainly as an aid to DX-TV reception. The prototype caters for twelve channels, but the number can be reduced or increased as required.

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# Twisted Tails

Les Lawry-Johns

WE'VE had hot Pyes and burning Bushes, but the one we came across the other day takes the cake (Alfred's). You could call it a cooked up cake.

A nice young lady came in to pick up a few bits and pieces and casually mentioned that the next time she passed she would pop in a portable TV set which had been involved in a fire and could possibly be of some use for spares.

Sure enough, a couple of days later she popped in and left a twisted mass of plastic with us. Unfortunately, we didn't know her name or address and just accepted the mangled mass as a kind of burnt offering. When time permitted, we did a cut away job to see what was left inside. Much to our surprise the inside was practically untouched and was obviously almost new. If the on/off knob had not been welded to the front panel it could have been used.

Carefully arranging the component pieces on the bench we switched it on and everything functioned as it should, so we thought it worthwhile ordering a new cabinet from the makers.

On the phone this proved to be somewhat more difficult than we had anticipated. We explained that the set had been in a fire not of its own making, and that the complete outside shell was required.

A verbal tussle then ensued. We would have to specify exactly which parts were to be ordered. I never, in my ignorance, realised how many bits and pieces go to making up the cabinet of a portable TV set. Each piece was the subject of earnest discussion and apparently would be dispatched separately. So far four pieces have arrived, and by the time the rest have been accounted for the postage and packing will have cost more than the new one of the same type we have for sale. It would also appear that somehow we have ordered two of each piece!

Anyone want a £70 portable for £140?

We are never without a hybrid Pye colour receiver for very long. The report on this one said that for some time there had been a sparking noise from the back, the picture had been blurred and that finally there was lots of smoke and off it went.

Inspection showed that the long gondola type focus unit (697 chassis) was just a mass of twisted plastic which could not be separated from the VDR rod inside. This had broken anyway (hence the sparking from the rear, as the excessive voltage hopped across the focus spark gap with the slider wire contacting the rod above the break ... I think). The final demise came when the first anode supply  $0.1\mu\text{F}$  decoupling capacitor shorted and the associated  $100\text{k}\Omega$  resistor cooked, as usual.

Replacing these items necessitates access to the component side of the panel, and a glance down inboard of the line output transformer showed R203 (the  $47\text{k}\Omega$  reference pulse integrating resistor) to be in no fit state to be left in. In fact it just crumbled to dust when touched, so how the line hold had been locked we'll never know.

With these itmes in we were ready to check through the rest of the supply lines. These seemed to be in order. We could not check the thing however because we were out of the long VDR focus units. Phoning around proved that Don, Ray, Fred and Harry didn't have one either, which meant a delay.

Ever the impulsive type, we decided to hook up one of the square, thick-film types to a point of lower potential.

Now I don't know if you've ever looked at the tripler units used in these Pye group hybrids, but one of the three outlets is marked "focus" and connects to C226 on the transformer. Connecting the high end of the thick-film focus unit to this point, the centre to the focus lead and then earthing the low end produced just the right potential. The set was back in action and fit to fight another day.

Nothing to do with TV (as usual), but what is the answer to this one?

We ordered and received from a wholesaler some clock radios (UK made). One when unpacked was obviously not new, and on close inspection the guarantee card had been filled in and dated December 1977. We contacted the wholesalers (and their rep) who said they would collect it. Some time later they did. Some further time later a replacement was received. When unpacked, it proved to be the same set with the same filled in guarantee card.

We again contacted the wholesalers. "Good Lord" they said. "Fancy that!"

Will you collect it and supply us with a new one or give us a credit note for it?" we asked.

"Well, it's not really our pigeon. It's really between you and the makers you know. We have a directive from our head office that our responsibility ends when we have supplied goods to the dealer."

"Second-hand goods?" we queried.

"As far as were were concerned, all goods supplied by us are new."

So we thought about this and taxed the rep on his next visit. He said he knew how it had happened. When his branch were out of stock on some items they obtained them from another. It was obviously not intentional on their part, but they had sent one which had previously been returned to the makers for service by them instead of by the dealer who had given the customer a new set instead of loaning them one until their own was returned.

This left one used set which was now with us, and still is. The makers say they have discharged their obligations and have serviced the set, and that it is up to the wholesalers to put things right.

Back on the phone to the wholesalers who have now closed the branch where we obtained the set and are no longer trading in this part of the country. ... Anyone want a new-used clock radio?

We called upon some friends to put their set right - an ageing ITT/KB VC4 used as a second set but still in mint condition except that the picture was dark and lacking width. Whilst we worked on the set, the lady of the house (a

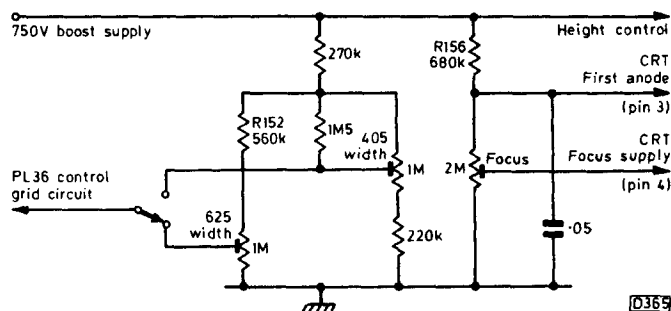


Fig. 1: Boost supply feeds in the ITT/KB VC4 and similar dual-standard monochrome chassis.

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formidable character henceforward referred to as "our Glad") worked on the dog, an inoffensive black spaniel named Soot. In fact the set responded to our labours quite well, which was a good deal more than Soot did a short time later.

The lack of width turned out to be due to no more than a high-value resistor (R152, 560kΩ, see Fig. 1) in series with the 625-line width control, while the dark aspect was due to low voltage on the tube's first anode (pin 3 – there was also low voltage on the focus pin 4 with the control fully up). Following the supply lead back, we came to R156 which is a 680kΩ resistor going to the boost line. This had also gone high, and being in series with the focus control (to chassis) the result was that the voltage available at the top of the focus control had got lower and lower as R156 went higher and the focus control's value remained the same. So in went another 680kΩ resistor and the set then gave a full-width picture with plenty of brightness to spare.

While all this was going on, our Glad laboured with Soot.

The idea was to comb out the tangled fur and clip off the surplus. Soot was becoming more and more anxious as Glad approached his rear end, and when Glad picked up the scissors his nerve snapped. It's one thing to have your sensitive areas combed, but when they are in danger of being clipped it is time to take action.

Giving a yelp of protest, Soot made for the door but found it closed. With his back to the door he prepared to do battle. He was not going to give up his vital organs without a fight. Glad was not used to dissension in the ranks however.

"Come here you stupid hound" she bawled in a voice which nearly shattered the windows. At the sound of that familiar trumpet Soot's courage deserted him. He slunk

back to the spread newspapers and Glad's clutches. Just then Glad realised that I was ready to go.

"Sorry Les" she hollered. "This dozy dog made me forget you. How much do I owe you?"

I told her, but apparently her purse was in the kitchen.

"Hold on to him for a minute love she said more quietly.

"Comb his ears or do something to keep him happy. They need clipping too."

So off went Glad and I soothed Soot.

"Has he got beautiful ears then?" I murmured, combing the long silky ears. "Does he want the naughty fur cut off? Yes, 'course he does." Being an expert on dogs, I grabbed the scissors and snipped at the long fur.

Soot gave an almighty scream and belted off dripping blood all over the carpet. At the same time I was surprised to find that as well as the fur I was also holding about half an inch of Soot's left ear in my hand.

Glad grabbed Soot as he shot through the kitchen and her scream rent the afternoon air.

"Ahhhhh, Ahhhh, look at his bleeding ear. You've cut the end off."

I stood struck dumb for a moment, desperately searching for words.

"Er, well, you have to clip their ears Glad. Otherwise they dangle in the dirt and pick up all sorts of things: a vet told me."

Glad glared at me in disbelief. "You're supposed to clip the fur, not the ear, you bloody fool. Poor old Soot's going to look lop sided now until his fur grows."

"Sorry Glad, sorry Soot." And with the score at one TV set repaired and one dog with a clipped ear (neither chargeable) we beat a hasty retreat. Anybody want their dog groomed?

# Frustrating Follies

*Les Lawry-Johns*

SOME very funny things have been happening around here lately. Take the other morning for instance. In came this fellow, well turned out and apparently friendly.

"Fark you" he said, and held out his hand.

Not wishing to return such offensiveness, I took his hand and merely said "Good morning."

## *Peacock Tale – Start*

"I have a Peacock" he confided. "It's got a bit missing. I know what it is but it gets red hot when I put it in and I wondered if you have a bigger one that won't get so hot."

Now I'm very easily confused. Most people get muddled when under stress. I start off muddled and when the stress starts I just go to pieces. My only salvation then is pure habit. So I reached for the job pad and started the routine.

"Could I have the name please?"

"I've already told you" he said impatiently. "Farqueue." He spelt it out, to my relief.

"What type of set are we on about?"

"A Finlux Peacock of course."

The penny began to drop, and the panic subsided.

"What value did you put in that got so hot?"

"I don't know much about these things, but my friend told me that I needed a 47 $\Omega$  wirewound resistor and I got a 17W one but it got red hot. So I thought if you could let me have say a 30W one it would do the job."

This sounded reasonable enough, so I managed to find a 47 $\Omega$  dropper of adequate wattage and off he went, leaving me to tackle an Ultra 6816 (1590 chassis) portable which had the complaint "not working".

## *A White Ultra*

Lifting off the shell, a meter applied to the regulator body (l.t. rail) showed about 7V, varying slightly. This proved a couple of things: the l.t. fuse was intact, and the current being drawn was not enough to blow it – provided it was of the correct rating. To check the latter point it has to be removed, due to its awkward position. So out came the fuse. It was correct at 2.5A. The next step was to check just what the current being drawn was. If it was low, the regulator itself could be faulty, if it was higher than normal the regulator was probably o.k. but was being overloaded. It was high, at about 2A, and varying. The 10 $\Omega$  resistor in parallel with the regulator transistor (on the front left) was also getting hot. On switching on and moving the volume control however some slight audio noise could be heard, so it was unlikely that the fault would be in this area.

Attention was therefore directed to the line output stage, where our old adversary the AU113 line output transistor was getting quite warm. This meant that it was unlikely to be at fault, since there are no half measures with this: if it shorts, it blows the fuse with none of your 2.5A niceties.

Since it was warm it was being driven by the line oscillator and driver. There was an overload on the line output stage therefore, and the first step was to unload whatever could be unloaded.

We didn't actually have to get that far. A finger on the 95V supply rectifier W14 was hastily withdrawn. The fact that the diode was hot meant that it was either shorted or had a short across it, probably its reservoir capacitor C111. Whichever it was disconnecting the diode at one end would remove the overload, so off it came.

There was an immediate response. The sound hissed into life, frightening the dog out of his life, the tube heater lit up, and we smiled. For a moment that is. There was a funny crackling noise, and we were back to square one. Voltage low, no hiss, tube heater out. Oh dear. Check this, that and the other to no avail. Precisely the same symptoms as before, except that there was no overheated diode to blame. Scan coils? Unhook the scan-correction capacitor C108 to check this possibility. No difference. With all else unloaded, only the line output transformer was left. What will Mrs. Carp say? Ring Mrs. Carp.

"Hello Mrs. Carp. Your little white portable needs a transformer and a couple of bits: it'll cost a bob or two."

"Never mind, it's all I've got so you do it and I'll be in at the end of the week."

"Righto Mrs. Carp, bye."

So in went the transformer and a diode. Check the regulator and solder up the bar of the tuner unit (it was practically off at one end). That was that.

## *Peacock Tale – Resumed*

Enter Mr. Farqueue.

"It's no good, that thing you gave me. It still gets hot and the set doesn't work properly with it. Will you have a look at it?"

So we got the Peacock on the operating table. The item in question was on the left side, or rather there was a space for it with two leads dangling nearby with clips on. There was already a dropper or large wirewound next to the empty space, and this was marked 47 $\Omega$ .

"I took out the one you gave me, as it was obviously wrong."

"It was your idea that it was 47 $\Omega$ , not mine" I protested stoutly.

"Well, what the dickens should it be?"

"I'll have to look it up." So saying I rummaged through my service sheets and wished I'd left them in the right order. There they were. Three separate sheets. Check on the layout diagram. The resistor in question was given as R111. Check the value of R111. On the power supply list this was shown as 390 $\Omega$ ! I whipped the sheet under Mr. Farqueue's nose.

"Look. 390 bloody ohms. Not 47, 390. Would you believe it?" Privately I was thinking to myself what funny things these Peacocks are. Who was I to argue?

Rake out a 390 $\Omega$  wirewound. Fix clips and switch on. Funny noise and the resistor smoked, but the Peacock didn't really respond. Apart from the noise, not much else happened, though the resistor was obviously uncomfortable.

Switch off and see what the circuit had to say about R111. Across the degaussing coils! Were the coils open-circuit? In any case the current should have fallen away quickly. And why didn't the set work without it? Panic set in and reason went out of the window.

Look more carefully I told myself. Recheck and be methodical, like wot you always tell other people to be. Check the degaussing circuit. The 390 $\Omega$  resistor is there on the board on the left side. If it's there, it can't be somewhere



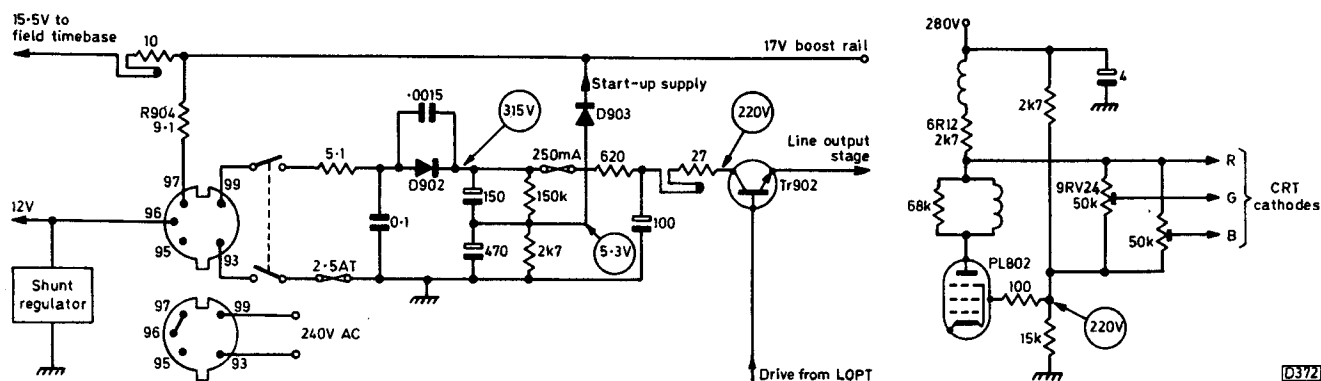


Fig. 1 (left): Since all the stages in the Indesit T12LGB monochrome portable are powered from supplies obtained from the line output stage, a start-up system is required. At switch on diode D903 feeds a reduced (5.3V) voltage to the boost rail to get the line oscillator, which is powered from the stabilised 12V rail, to start. Once the line output stage comes into operation, the 17V boost supply is developed and D903 switches off. With no link between connections 96/97 to the mains plug, the line oscillator can't start. Hence no results.

Fig. 2 (right): Luminance drive to the c.r.t. cathodes, Bush CTV25/CTV162 series. An intermittent heater-cathode short in the green gun led to the demise of 9RV24, leaving the green cathode without drive.

else, can it?

So we have two items marked R111 on the sheets. One is obviously right. So what should the other one be? Check the power supply layout shown against the circuit, and check the values. The large 47Ω wirewound is shown as R115. Its listed value is 1kΩ! Is there a 47Ω resistor on the list? Yes, R104. Ah.

If that's marked wrong, what else? The one item not in the set is R102, 4.7Ω. It's also not shown on the layout.

It's a good bet therefore that if R115 is actually R104, R111 should really be marked R102. Proceeding on this tack, we fitted a large 4.7Ω resistor and checked the flyleads back, just to be sure. Yes, a bullseye! Connect up and switch on.

O.K. sound. O.K. vision, R102 normally hot only. Mr. Farquhar departed with his Peacock, having witnessed a triumph of mind over wrongly marked service sheets. Trader service sheet, 3154/T411. Horizontal chassis layout. Change R115 to R104, R111 to R102.

## An Orange Indesit

An orange Indesit. No not colour, just one of those little T12LGBs. We've had our share of these in for repair, as most have I suppose. Usually they're not a lot of trouble, neither would this one have been if . . .

Chap by the name of Beaton brought it in with just the message that "it doesn't go."

When its turn came we plugged it in. Sure enough, nothing. Off came the shell and we checked the supply from the socket up to the on-off switch. Everything in order so far. The fuses were intact and our tiny mind started saying "pump circuit, start-up supply to the line oscillator," and funny things like that.

We had full h.t. at the collector of the pump transistor TR902 (see Fig. 1), but this was not switching on. We had very nearly 300V in fact, instead of about 220V. Reaching for the circuit and looking at the line output and power circuit, we missed what was right under our nose and continued the search, moving on to the start-up supply diode D903. This should have 5.3V at its anode, but the reading was only 2.5V. We then started to panic. Check here, there and almost everywhere. Everything read right, transistors, electrolytics – nothing escaped examination. At last my spirit broke.

I turned the convergence mirror and looked at my

ravaged face, careworn and despair written on every line. I let out a despairing cry and buried my head in my hands.

At this, my little honey bee came on the scene.

"Now what" she asked. "What's all the noise about?"

"I'm finished, that's what. I'm going to do away with myself and end all this suffering."

"You said that last week" she said sympathetically. "I saw the insurance man, but you didn't do anything."

"Well I'm going to, you'll see. You'll miss me. At the going down of the sun and in the morning, you'll remember me. You'll be sorry when I've gone to New Zealand and walked into the water at some lonely beach, never to be seen again."

"New Zealand? Why all that way when the river's only a few hundred yards off."

"The water's cold, that's why."

"What's it all about. Can't you find out what's wrong with that little set?"

"No I can't, and I've checked everything."

"Probably the plug. Anyway I've got a lot of things to do."

So off she went. The selfishness of women never ceases to appal me. Warily I turned back to the horror.

Glancing down at the circuit again, I saw some funny drawings of the mains input and battery input plugs. As well as the actual mains input connections, there's also a link on the mains plug connecting pins 97 and 96 to feed the 12V shunt regulator. On reversing the small input panel, and with the plug in but not connected to the mains, we found that there was no continuity between the two pins. Slapping a shorting link between them and applying the mains brought on full sound and a raster.

All that suffering for nothing. I should have tried it on battery first. Removing the link and examining the moulded mains input plug (socket) showed that it had been tampered with, so that the connectors on the link side could not make proper contact. When will I learn?

## And a Mauve Bush

Some years ago we had sold a Bush CTV162 (a 19in. development of the CTV25). It came in the other day with the complaint that the picture had gone mauve.

As far as we could see (not very far), it was simply a matter of finding out where the green had gone. The best place to start is at the tube base, to see if the green first anode is low or the grid-cathode voltages too close

compared to the red and blue guns. The first anode of the green gun was about the same voltage as the red and blue first anodes, so we checked the green cathode. This seemed much the same as the other two cathodes, but there was a sudden surge of green illumination when the meter touched the pin.

Noting this fact we checked the three grids, which were all 100V give or take a volt or two. So we went back to the green cathode and checked again. The meter swung up to the 200V mark (approximately) and the screen glowed green. When the meter was applied to the red or blue cathode there was no increase of either colour, which was queer since all three voltages are obtained from the PL802's anode, the blue and green via two presets (see Fig. 2). Presets, that's it.

Sure enough the green preset 9RV24 read open-circuit, and in fact was found to be burned out. Must have been a nasty flashover, we stupidly thought. To see what would happen we fitted a new preset and set it up. This resulted in fully adjustable green, and after a bit of fiddling a well nigh

perfect grey scale. Turning up the colour presented a very creditable picture indeed.

Nothing untoward happened for quite some time, and we were beginning to think that our fears were groundless when there was a sharp metallic click and off went the picture. Scrambling for the meter was rendered unnecessary because the green preset smoked up and the PL802's anode resistor 6R12 became red hot. Heater-cathode short in the green gun.

Look at circuit. The tube heater was not alone on the 6.3V winding, so we couldn't play tricks with it. We had an RS heater isolating transformer on the shelf however, so this was pressed into service – screwed on the centre woodwork under the tube. Connecting the primary of this to the mains 5A fuseholder and chassis, with the secondary to the tube to replace the original heater leads, resulted in normal results once the preset had again been replaced and the PL802's load resistor checked. We added a 100kΩ resistor from the green cathode to the heater to remove any potential stress however, and it's been as right as ninepence ever since.

# Series Voltage Stabilisers

*S. W. Amos, C. Eng., B.Sc., M.I.E.E.*

ONE of the disadvantages of transistors when used in analogue equipment is that their performance varies with the supply voltage – users of battery-driven transistor receivers are well aware of this. For consistent performance the supply voltage must be constant, and it's normal practice in television receivers and hi-fi sound equipment to incorporate a voltage stabiliser in the power supply circuits. In portable television receivers designed to operate from car batteries or the mains supply, the stabiliser circuit must be capable of working with an input voltage as low as 12V.

The stabiliser has two distinct functions. First, to maintain a constant output voltage (which can be predetermined) despite variations in input voltage, whether from the mains or batteries. Secondly to maintain a constant output voltage despite variations in the current drawn by the receiver. This latter quality is often termed "good regulation", and is achieved by giving the stabiliser circuit a low output resistance. This also has the advantage of minimising any tendency to instability in the receiver due to the common impedance of the power supply circuit.

Most of the circuits used to give a constant supply voltage are series stabilisers, which can take many forms although using a common principle. A number of these circuits are analysed in this article to demonstrate their advantages and disadvantages. But first it's useful to consider series stabilisers in general, so as to identify the functions which are necessary for their proper operation.

The block diagram shown in Fig. 1 shows the essential features of a series stabiliser. The stabilised supply is derived from an unstabilised supply (e.g. a mains rectifier or a car battery) via a series stabiliser stage which is controlled so that it maintains a constant output voltage. The control signal is derived from a comparator stage which compares a sample of the stabilised voltage output with a constant reference voltage. If the sample of the stabilised voltage is obtained from a potential divider as suggested in Fig. 1, this divider can be adjusted to give a desired value of stabilised voltage. The constant reference voltage can be obtained

from a zener diode which can be fed via a series resistor from the stabilised or the unstabilised supply.

## The Classic Circuit – and Variants

The comparator stage can for example be a single npn transistor (see Fig. 2) with the sample voltage applied to the base and the constant reference voltage applied to the emitter. The zener diode then effectively presents the emitter with a very low impedance, so that the full gain of a common-emitter amplifier is available from the comparator transistor. If there's a sudden increase in the current drawn from the stabilised supply there's a tendency for the output voltage to fall. This causes a fall in the base voltage of the comparator transistor, and its collector voltage therefore rises. This positive voltage step is applied to the base of the stabiliser transistor and, to supply the additional current required, the stabiliser transistor must be made more conductive by this positive step in the control signal. The stabiliser transistor must therefore be an npn type. A second requirement of the stabiliser transistor is that it must not introduce phase inversion: the positive step applied to the base must cause a positive step in stabilised output voltage so as to offset the fall in stabilised voltage assumed initially. An emitter-follower is therefore the obvious choice

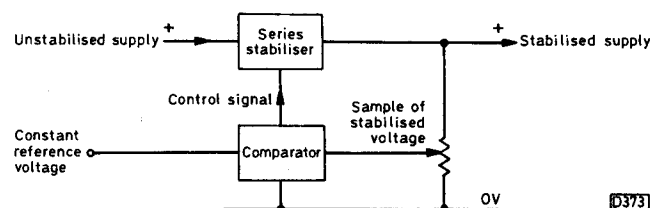


Fig. 1: Basic features of a series stabiliser circuit.

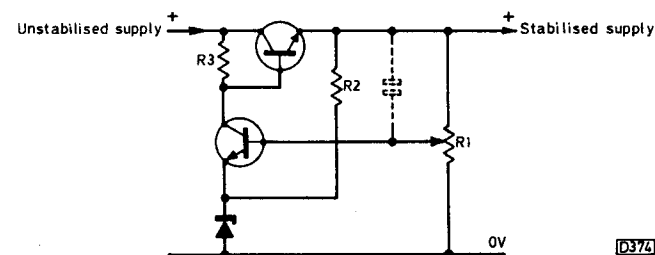


Fig. 2: The "classic" series stabiliser circuit, requiring an npn emitter-follower as the series stabiliser element.

# Daymares

Les Lawry-Johns

NICE chap he was. Not at all the type who would string you a line. So when he brought in his ITT CVC5 for repair and said the picture was narrow and bright we just jotted this down on the job sheet and suggested he called in the following day. When its turn came to be placed on the operating table, we switched it on and allowed it to warm up. Sound OK; narrow, bright, defocused raster with barely a glimpse of modulation on it. Where to start? Lack of width. Right.

## Timebase Troubles

We didn't really suspect valves but, just to be sure, we put in a new PL509 and PY500. Result, no line output at all, with the valves overheating. Queer. Put original valves back in. Still overheating. Very queer. Check, check and check. Finally find we had put the top cap leads on wrong. They should cross over. Idiot. Try new valves again. No better.

Check line drive. High. Check values of width circuit resistors. R411 (560k $\Omega$ ) very high. Ah, ha!

Fit new 560k $\Omega$  resistor. No different. Remember past experience and check R403 which turns out to be OK. Boost line voltage high.

Let's have another look at whatever picture there is. Can't really see much. Switch off green and blue guns, leaving just red. Some sort of picture could now be seen, just.

This showed that the line timebase was running at the wrong speed, although this was very difficult to see as the field was rolling like mad. Resetting the field hold control slowed the roll and then sent it tumbling the other way. Careful setting left it rotating slowly and also showed that a dark hum bar was travelling slowly upwards (our troubles were multiplying by the minute). The hum bar and rolling were put aside mentally as minor things, the multiple line images looming larger.

It was reasonable after the checks so far to assume that the lack of width was the result of grossly incorrect line speed. Since we'd had a similar tussle with a single-standard Bush receiver the previous day, checking all the usual things (capacitors etc.) and finally finding the flywheel line sync discriminator diodes way out of balance, our first onslaught was on these. They were perfect of course. Having tried a new PCF802, we next changed the polystyrene capacitors in the line oscillator circuit. No luck here.

At this point we noticed a tiny piece of white wool sticking out of the oscillator coil. The core turned out to be stuck fast, and it was evident that it had received attention. It was also evident that it would have to be drilled out.

At this point we started to get a little irritated, since there had been no suggestion that the set had received previous and unsuccessful attention. We would definitely have to have words with Mr. Fieldhouse upon his return.

We decided to press on however. Now the proper way to drill out a core in one of these angled chassis jobs is to remove the coil completely and put it in a vice. Being impatient types we did no such thing. Taking the angle into consideration, we first attempted to put through a pilot hole with a small drill. The angle was wrong of course, and when

the drill came out it had little bits of copper on it to announce the fact that we had ruined the coil which would have to come out anyway. We just happened to have a replacement coil, so out came the damaged one and in went the replacement. The core of the old coil was the wrong type anyway, being much too short to tune down to 15kHz. Someone really had had a go Mr. Fieldhouse.

With the new coil and the right core, no adjustment was necessary. The rolling red picture had a single image of full width, but of course still with the hum bar. Switching on the blue and green guns showed terrible convergence – and no sign of a colour signal. To boot the picture, such as it was, was very noisy, which could account for the lack of colour signal. Hope springs eternal in the human breast. At this point we decided to consult Mr. Fieldhouse.

"No" said Mr. Fieldhouse. "No one has been at it since it was last repaired a couple of years ago, but I must admit the colour has been funny and we have had that bar going up the picture."

"Sorry Mr. Fieldhouse, but the set could not have worked since the last time someone had a dabble."

Mr. Fieldhouse looked puzzled. "Well we've been away for nine months, but it definitely worked when we left."

Then comprehension dawned. "Can I use your phone?"

He rang a number and the conversation got heated. He rang off and turned to me.

"Sorry old chap" he said. "You're quite right, someone has been at it while we've been away and my relatives know more than they're letting on."

Having cleared up that point, it was a matter of whether I could do it, how long it would take and how much. I didn't relish the job, but we decided to press on.

Rolling responded to a new PCL805, with a check on the interlace diode and the sync separator circuit. The hum bar was banished by fitting a new l.t. bridge rectifier, and the nearby fuse was replaced because it was bridged by a length of fuse wire and dabs of solder. The line output stage supply fuse was also too heavy, which explained why it didn't fail when we got the leads mixed up.

The convergence and grey scale were painstakingly brought into line, and the grainy picture responded to a.g.c. setting up.

## And a Got at Decoder

Faint colour bars were seen running through what was now a reasonable black and white picture, and it was noticed that the subcarrier oscillator preset R311 on the edge of the panel was actually touching the metalwork. It was moved and adjusted. The bars now resolved into a cyan picture, with no red in sight. Voltage checks next revealed that the bistable (see Fig. 1) was inoperative, one transistor being hard on, with practically no collector voltage, while the other was turned off.

Some time was spent looking for an explanation for this. Then the phone rang and the high priest of *Television* himself enquired about our health and about an article recently submitted. I poured out my heart to this kindly (occasionally – *editor*) soul who listened for a while and then said:

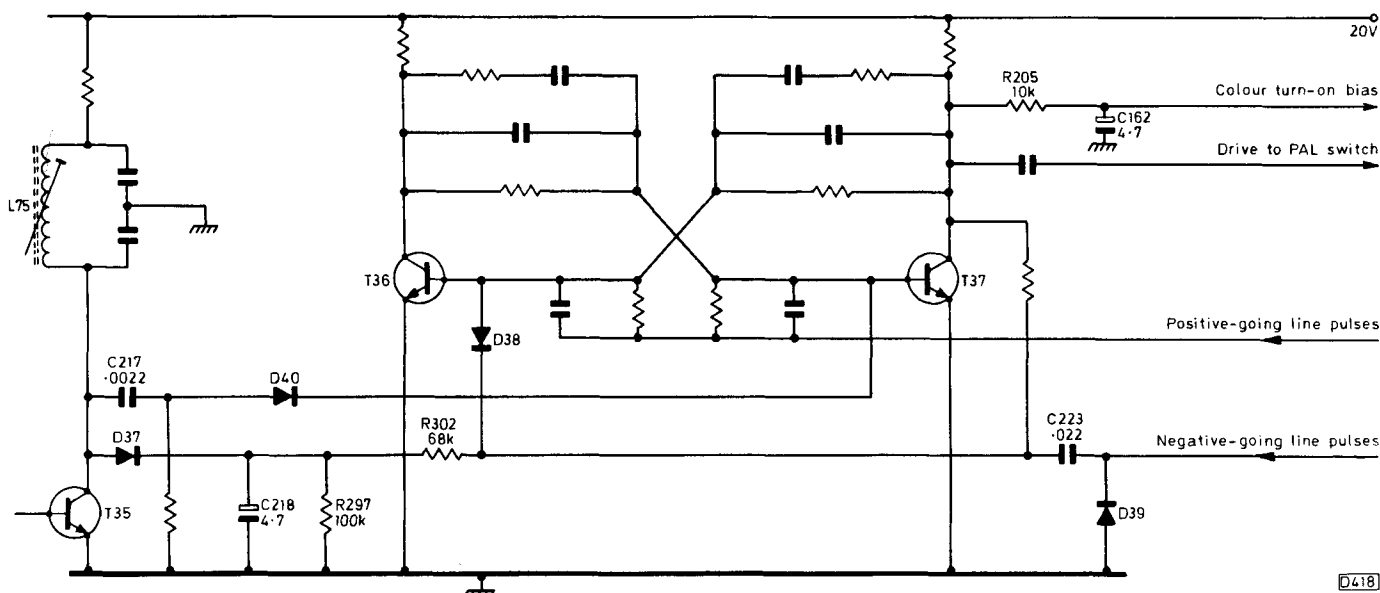


Fig. 1: The ident amplifier (T35), bistable (T36/37) and colour-killer arrangements in the ITC CVC5 chassis. On colour, the squarewave produced at the collector of T37 is smoothed by R205/C162 and used as a turn-on bias for the delay line driver transistor in the chrominance channel, with the positive-going line pulses triggering the bistable. This means that on monochrome the bistable circuit has to be stopped. This is done by applying negative-going line pulses, clipped by D39, to the base of T36 via C223 and D38 to ensure that it remains cut-off. T37 will then be permanently on, and there'll be no colour turn-on bias. On colour, D37 rectifies the ident signal produced by L75, and the positive bias developed across its reservoir capacitor C218 cuts D38 off so that the negative-going pulses no longer reach T36's base. D40 provides the ident action on colour to ensure that T36/7 switch in synchronism with the V signal line-by-line polarity inversions.

"But there shouldn't be any colour at all on the CVC5 if the bistable isn't working. You must have ditched the colour killer." I hadn't.

He then suggested that all I had to do was to unditch the killer and find out why the bistable wasn't switching. All the agony would then be over.

I thanked him humbly and rang off. Just who does he think he is? "All I had to do" was find out why the bistable wasn't working . . . Suppose I'd better do as he says . . .

Examining the panel on the print side, I found a nice little 12k $\Omega$  resistor wired from the 20V l.t. line to the junction of R204, R205 (TP18), thus over-riding the colour-killer . . . Someone had left it in, having failed to sort out the bistable.

Mr. Fieldhouse had said that "the colour had been funny". He wasn't kidding. So we removed the 12k $\Omega$  resistor and sure enough the green faces became white. We next found that there was no 7.8kHz output at the collector of the ident transistor T35. At that moment the whole horrible truth burst upon me. There was another tuft of white wool, this time just protruding from the ident coil (L75). Oh no, not again. Investigating the core showed that it could be easily moved, but that it was nowhere near long enough to tune the coil to half line frequency. Wearily we sorted out the right type of core and screwed it in. The bistable started flip-flopping, and lots of lovely colour flooded the screen, the right ones at that. A final trim up was all that was left to do.

Mr. Fieldhouse called and declared he'd never seen such lovely colours since he'd had the set. He also confided that he'd found out who'd had a go.

### Woodman Spare that Tree

Now you're not going to believe this but, on a stack of bibles, it's true so help me. Mr. Wood is a regular customer and is a very nice jovial sort of man, which is just as well since he appears to be a very strong fellow indeed. You should see the way he carries his old Philips G6 (26in.) solid teak monster from his Range Rover into the shop, and then lifts it on to the bench as though it were a portable, laughing

like mad at the thought of the money it is going to cost him for its repair. They don't come like him very often. By profession he's a woodsman, or tree surgeon, and a very good one at that.

His set doesn't really come into this, but in fact it took a little while to knock into shape. The complaint was "no picture" which we confidently thought would turn out to be an inoperative line output stage. With the top cage off the line output section, we waited for the thing to warm up. A neon waved near the PL509 glowed healthily enough.

"Is there a tingle when you put the back of your hand on the screen Mr. Wood?" we enquired.

"No, not a sign" said Mr. Wood.

Now I know what you're thinking. These names he keeps on drumming up: surely he could do better than this? I'll have you know that his name is definitely Wood however, so there, and just to brighten your day a little more I'll also acquaint you with the fact that our butcher's name is Reg Butcher, while the name over the baker's shop down the road is Baker.

Now. Ah yes, no e.h.t., line output OK.

Take cover off to reveal the PD500 shunt stabiliser and GY501 e.h.t. rectifier valves, and risk instant sterilisation by X rays . . . There was plenty of life at the bottom, er, top cap (it's mounted upside down, as you know) of the GY501, i.e. the output of the transformer, but little else. No visible heater glow. The PD500 looked OK, but there was no life on its glass. Open-circuit GY501 heater? Slacken screws and lift PD500 (set off, of course); free off plastic shroud and remove. Lift out GY501. Check heater. OK. Check continuity of heater winding. OK. Check continuity of resistive element on valve base. Open-circuit. Should be 2.7 $\Omega$ . Remove resistor and fit replacement. Reassemble while listening to the fascinating story being related by Mr. Wood. E.h.t. now OK. Nice picture. Tweak up convergence and set up grey scale. Set wrapped up. Now to the story.

A certain gentleman had some land that verged on a fairly well used road. On his land was a large elm tree which had escaped disease. A large bough overhung the road

however, and the local council decreed that it must be removed. Mr. Wood had been called in to advise and estimate. This he did.

The estimate did not please the gentleman, who said he could do the job himself – with the help of his wife.

With stout ropes to lift and guide the bough, a long rope was passed up through a pulley and back down and tied to the back of a vehicle. His wife was entrusted to keep the rope taut with the vehicle in first gear and pulling. Told to move forward when instructed. You see?

So there was hubby up the tree sawing away at the hefty bough. "Stand by." "Right." "Take the strain." "OK." "Here she goes." "Right."

Crack went the bough. The vehicle strained forward.

Then down came the bough and up in the air went the Mini.

## Return of Mr. Doubleday

I was busy trying hard to understand a little book which a young boy had left on the counter, called "How Transistors Work", and had almost got to the third page when an estate car drew up outside. Oh dear, it was Mr. Doubleday from Bluebell Hill, Hill.

"It's gone again, again" he moaned. "I swear it spends more time in your shop than it does in my house house."

My heart sank and I offered him £10 to take it away as it had cost me twice that in transistors the last time.

"No" he said. "I'll have it done once more and then out it goes goes."

"But it costs me more than it does you" I protested.

"Just this last time."

So off he went and I got down to the 8500 Thorn again again.

The cut out was cutting out (it gets you, this repetitive

business).

Lifting the line output transistor's collector lead from the transformer stopped the cutting out, so we were back to the old routine again. Checking the transistor (BDX32) confirmed that it was in no fit state to operate, with an emitter to collector leak. All the feeds were checked, and to be on the safe side a new e.h.t. unit was hooked up.

Switch on. For a second all was well, then there was a nasty flashover from the e.h.t. connector to earth. The cut out opened and another BDX32 bit the dust.

The one thing I hadn't done was to clean off round the e.h.t. connector on the tube. Now this I'd done most thoroughly quite recently, which I suppose was a partial excuse.

Re-examining the connector of the e.h.t. unit previously in the set showed that the "claws" were rusted to the point where they just broke off when touched. But the thing hadn't been in all that long. The bitter truth now dawned. Even the connections to the recently fitted focus unit were green. What sort of conditions had the set been living in?

In the event we fitted another BDX32, another e.h.t. connector, thoroughly cleaned off the tube area with silicone and polished up the focus connections. The set then functioned quite well.

Mention has been made in past *Televisions* about the adverse conditions many sets operate in or are expected to operate in. Kitchens are obviously not the ideal place. Many people leave a paraffin stove working all day however, and these give out as much water as the oil they consume.

When Mr. Doubleday returned we laid it on the line for him in no uncertain terms. It transpired that he was out all day, and used the set for only a few minutes in the evening. All the rest of the time the set was gathering all the dampness it could from a paraffin heater. These bachelors!

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# JAWS 3

*Les Lawry-Johns*

WHEN you first come face to face with a shark or perhaps a crocodile, what is your first reaction? Fear? Flight? This would have been mine I must admit. Until last week, that is. Now it would be infinite compassion, sympathy and sorrow for the poor beast, cursed with so many teeth to give it trouble.

Nobody knows the agony I've suffered of late, and apparently nobody cares — except to fall about laughing when I tell them of my plight. I shall never know why it is that when others are in trouble I'm all ears, attentive and grave, listening to their tale of woe and making sympathetic clucking noises. Yet when I'm in the mire, I might just as well be alone in the middle of the desert for all the sympathy I get. Perhaps I get in the mire too often.

You'll listen though, won't you?

For some time I'd been aware of a nagging ache up on the top left side. I concluded that it was due to an infected gum, and therefore washed it regularly with brandy. The ache came and went without giving too much trouble, and although I toyed with the idea of phoning Mr. Pullit for an appointment I kept putting it off as I am a fully paid up member of the Cowards Union.

I was tackling a hybrid GEC colour set which had the complaint of no colour however. I must admit that the decoder panel on these sets is not one of my favourites, and I always end up in a muddle. I tried to be logical, but kept going round in circles because the gated burst amplifier transistor TR325 wasn't being turned on. This was apparently due to the gating diodes D303 and D304 (see Fig. 1) not being switched on by the line pulses which were there but not very strong. The question was, why? I kept going round and round from the line output transformer to the decoder, and the dull ache was rapidly becoming a nagging pain. Aspirin, aspirin, that's the stuff. Enter wife carrying aspirin and ice cold water. Exit wife carrying ice cold water.

"The pain will go as soon as you get that set right. If it doesn't, phone the dentist for an appointment and don't be a coward."

"I can't get the set right, there's no colour signal. I know why, but I don't know why."

"You mean that that's supposed to be a black and white picture?"

"The fact that the grey scale is a mile out isn't what is causing me the trouble. I can put that right in no time. Once I get the colour signals through I can turn them off and sort out the black and white. All right?"

She pondered this for a moment. "No it's not. You always tell other people to get it right in black and white first. Why don't you do it if it's such good advice?"

"Oh all right. Just to prove it to you. If the tube's O.K., I'll present you with a beautiful black and white picture inside ten minutes. But that's not going to help my colour problem."

It was a bit of a relief to get away from the decoder and the poor gating pulses, so the tube base voltages were examined. The first anodes were about equal, but the blue grid was a fair bit out. In went a replacement PCL84. On came a BBC-1 test card. In full colour . . .

The gating pulses were now at full strength. Colour

turned down produced fair black and white. Looking again at the circuit showed that tag 4 on the line output transformer also supplies pulses to the grids of the three PCL84 triode clamps in the colour-difference output stages. So a faulty triode can mangle the gating pulses to the decoder as well as mess up the grey scale.

Enter wife. "How's your face?"

"Red."

"You've got the set right in black and white then."

"Yes, and I've solved the colour problem as well."

"Who's a clever boy then?"

Just to prove it, I turned up the colour and there it was as good as new.

Which all goes to show how little women know about anything, because my jaw ache was now worse, not better. So with a fantastic display of courage I phoned the dentist, expecting to be booked in a few days later.

"Come round now."

"Er, you don't mean right now, do you?"

"Yes."

Sitting back in the chair with a bib under my chin I indicated to Mr. Pullit which tooth had the abscess over it.

"Ah yes, there's some infection over it." So saying, he did whatever dentists do with a needle and then left me there to mull over my fate. Would it break on the way out? Would there be complications with ambulances screaming all over the place, collecting blood to replace that which I would probably lose as Mr. Pullit fought to remove my mighty molar?

After a while Mr. Pullit returned from his ablutions, tilted my head back and inserted a pair of insulated pliers into my open mouth. My jaw cracked open and the world exploded.

"You can stop screaming now, and wash out your mouth. It's not a bad tooth really. Pity about the infection."

"Make another appointment on the way out and I'll clean up the rest."

## *Gorn Green*

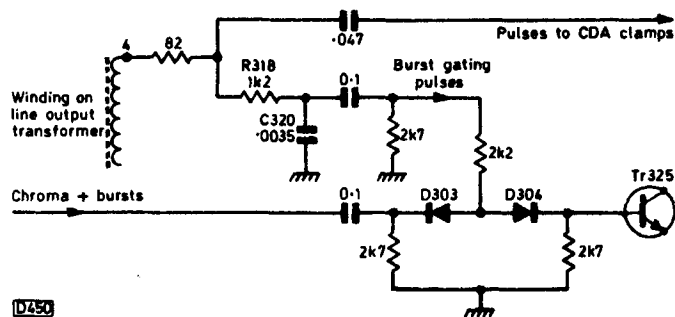
With grave doubts I arranged for another visit in ten days, then continued to a couple of service calls.

The first was to a Philips G8 which looked greener than I did. The c.r.t.'s green cathode voltage was low, directing attention to the relevant BF337 output transistor. Its base voltage was higher than that of the other two. Switch off and check the transistor. Reads right. Switch on again and note that the screen didn't go green for quite a few seconds. Grab the freezer and prepare to spray. Probably the preceding i.c. No. Next spray the BF337. Instant results, with normal screen illumination. Change BF337 after all. Nice lady thanks me for prompt attention and asks me if I am well. I tell her about my tooth. She tells me about all of hers (one by one), which takes longer than the repair of the set did.

## *Gert Knotted*

Mrs. Knotted is a well known local character and there was little need for formality.

"Wotcha Gert!"



D490

Fig. 1: Burst gating circuit used in the hybrid GEC colour chassis. Positive-going pulses from the line output transformer, delayed and shaped by R318/C320, forward bias the gating diodes D303/D304 to let the burst signal only through to TR325. With no burst getting through there's no colour of course, since the ident amplifier and colour-killer rectifier stages don't operate. Tag 4 of the line output transformer also feeds pulses to the triode clamp circuits in the colour-difference output stages. A defective clamp triode can reduce the amplitude of the burst gating pulses, thus removing the colour from the picture as well as upsetting the grey scale.

"Wotcha Lawry!"

"How do you like your new house, Gert?"

"The \*\*\*\*\* house is all right Lawry. I don't feel so good though, it's that bum of a landlord along the road, selling gin that's been \*\*\*\*\* about with. Makes me sick it does. He must be \*\*\*\*\* barmy trying that one on me. I ask you, twenty five years up the high street and he thinks I don't know gin. I'll get the git I will. He'll be sorry."

I lapsed into sympathetic silence, and started work on the set. After all, how could anyone hope to get away with selling dud gin to Gert? I knew the chap in question. Into every shady deal you could think of. But I didn't think he was that daft.

However, the set was a Thorn 3500, with very queer symptoms indeed. There was some sound, but the screen illumination was dull and grey with occasional bursts of lines of colour in vertical bands - green, red and yellow - which came and went, leaving again the dull grey raster which undulated to betray heavy hum.

Switching off, we unplugged the power panel and persuaded it off its top clips. Turning the unit round showed the main smoothing block to be in a very sorry state. The negative tag was a good half inch away from the unit, leaving a gaping hole through which the connection still protruded.

"Picture valve gone has it Lawry?" asked Gert. "Stan said that's what it'll be."

"Must have done Gert" I muttered. "Can't find one anywhere."

So in went a new smoothing block, and back went the power unit. The only change was that the blank raster no longer undulated. I then found that the contrast at the back had been turned right down: turning it up produced a nice lot of lines across the screen. These couldn't be resolved with the line hold control. With a bit of luck, this turned out to be the first capacitor tested, namely the electrolytic (C511) in the reactance transistor's emitter circuit. The line hold was now good, and the colour could be tuned in. I was about to make some witty remark to Gert when there was a funny noise, the screen centre appeared to be occupied by an hour glass and I was aware that the side of my face was beginning to throb.

Now wait. Hang on. Don't panic. Could it be my rotten soldering on the main electrolytic? Could it be the 1,000 $\mu$ F reservoir capacitor in the supply to the 30V regulator? Slap another one across it. Bingo!

"You're O.K. now Gert, must get going."

"Thanks Lawry. Was it valve trouble?"

"Not really Gert. Your thingamy bobs had dried up."

"Don't you believe it love" said Gert.

## The Second One

So off we went with the ache getting worse. Back at headquarters there were many things to do and by the time they were all sorted out it was too late to check with Mr. Pullit.

"Didn't you go to the dentist after all? Lost your nerve?" asked my ever considerate spouse.

"I did go and he took one out, but it's aching just as bad."

"Did you tell him which one?"

"Course I did."

"Then you told him to take out the wrong one, didn't you? Trust you to muck things up." Now you won't believe this, but she actually started to laugh. Laugh, I ask you. So did Harold when I later tried to kill the ache with brandy. Funny how landlords of pubs find other people's mistakes funny. Like wives I suppose. Under the sheer weight of spirit consumed, I had about four hours' sleep before cramming aspirin or something down my throat. Soon after nine o'clock I was back in the torture chamber.

"You pulled out the wrong one."

"Oh no I didn't, that one had to come out. So will all the rest in time."

"The rest don't ache, only that one up there."

So out it came with a sickening crunch.

"Good tooth that. It's a pity you dallied so long with the other one and let the infection spread. Nip in and have a look at my telly when you're passing, will you? People's faces look like yours does. Sort of green."

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# It Went Bang!

Les Lawry-Johns

WE'RE getting quite a few Pye group sets in lately, of the 725 series ilk – CT223, 225, etc. From a practical servicing point of view there's not much to separate the 731, 725 and 741 series. All have the vertical panels in moulded frames, two on the left of the tube, one on the right.

Depending upon the symptoms reported, one either leaps for the left side signal panel which houses the tuner, the i.f. strip etc. on the lower part, and the decoder and colour drive circuits at the top; the more central line timebase panel; or the right side field timebase, power supply and convergence panel.

One gave us a distinct shock the other day however – one which is worth bearing in mind. It happened like this . . .

## A Woman of Distinction

The moment Mrs I. Glass walked in I could tell that she was a woman of distinction. A real big spender. Good looking, so refined . . .

"My name's Glass, Ida Glass. My husband put it in before he left for work. Perhaps you could get it out for me to save me straining." She had deliberately left out the words car and TV, but I could see through her. I never mix business with pleasure. For one thing, it makes giving estimates difficult, if one is asked for.

"No trouble madam," I gave quite a bow, thus allowing full vertical scan. With a huff and a puff the CT223 was whisked from the rear seat and into the shop.

I remembered her now. She was the one who brought an amplifier in and said she was dead on one side, and I'd said it was probably due to lack of drive, not being turned on or some such rubbish. Oh yes, cheeky type. Think they can get away with murder. Usually can.

## "It's the on/off switch"

"It's the on/off switch," she proclaimed with certainty. "It blew the fuse over on the other side."

My eyebrows shot up. Whilst the centre h.t. fuse is in full view with the rear cover removed, the 3·15A mains fuse is partially concealed over on the right, behind a vertical strut.

"How do you know all this?" I asked. "Mind you, you've got it round your neck, but that's not a bad place to be."

With a quick nod and smile, she acknowledged the import of the latter part but took up the challenge.

"We took the back off and followed the mains lead to the switch and then over to the other side where we saw the fuse was all black, and since the switch is the only thing between the mains and the fuse, we knew it had to be the switch."

Amazing, isn't it? Such logic. Nice but so wrong.

I didn't take the trouble to explain that the cause must be after the fuse in order to blow it, but since the mains filter capacitor is only a small item it wasn't worth an argument.

"Never mind dear. You've got it a little bit wrong, but only a little bit, and we don't want to quibble over a little bit, do we? You pop off and do your shopping or something and I'll have it sorted out by the time you come back."

So she started up her motor, and with hips swinging went out to her car. Nice movement. Nice class. Cut glass.

Now the set. Sure enough the fuse was shattered and the filter capacitor was a dead short, with a bit of the plastic blown off the side to show its innards. In went a new capacitor and a new 3·15A anti-surge fuse. Apply mains, and all hell broke loose.

There was an ear-splitting howl from the loudspeaker, which sounded like a beserk foghorn, and funny noises from the back of the set. The dog fled in one direction and the cat in another. I punched in the on/off switch but it didn't function. The racket continued until I switched off at the mains. At the same time I caught a glimpse of the tube heaters. Like three 100W bulbs.

With shaking hands, I rolled myself a cigarette. The dog's head peeped round one corner and the cat's round another.

"Cowards" I accused them.

I reviewed the situation. Obviously the voltages were sky high everywhere. But why all this, after a simple blow out of the mains filter capacitor? And what damage had been done?

Let's have a look at the print around the capacitor. Nothing wrong, and we would have seen it anyway when the new one was fitted. Have a look on the component side. This preset control looks a bit queer. The wiper's not contacting the track. There isn't any track. It's gone. And it's RV917, the coarse set h.t. control.

Of course! The side of the filter capacitor had blown off, and had sliced off the track of the control on its way into orbit. Ah well.

New 4·7k  $\Omega$  control fitted and set midway. Stand back. Switch on. Normal sound hiss, tube heaters normal. Check h.t. 170V at centre fuse. Dead on. Well, well.

Picture on, but only a few inches high. Not much voltage on the field output transistor VT688. Peer over the back of the line output section. Thermal resistor R686 in the feed to VT688's collector unsprung. Solder up to restore 25V supply line.

Looks good, except for the on/off switch that is. She did mention that. Nickers.

## Bang, bang, Wallop!

Having had my nerves strained already, I didn't deserve the next one. Mr. Crabtree said on the phone that his Bush colour set had gone pop and he was bringing it in. I assumed that it would be a dear old A823 chassis with a shorted BT106 thyristor h.t. rectifier or something. No such luck. It was one of these new-fangled BC something or the other models fitted with the Z718 chassis. You know the one. Long thin panel, which swings down, across the rear.

With this down one can see the power unit, supported by a strut on the left and a clip over the main electrolytic on the right. It has two fuses, a 2·5A anti-surge one on the right of the panel and a 5A HRC type on the left. The former was

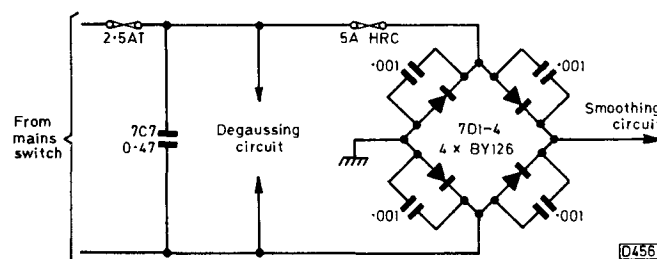


Fig. 1: Mains input circuit, Rank Z718 chassis. Note that the chassis is live whichever way round the mains plug is connected.

blown and blackened, which tended to direct suspicion on the 0.47 $\mu$ F 1kV mains filter capacitor 7C7 (see Fig. 1). The capacitor was not at fault however.

A meter check next showed that one of the bridge rectifier diodes was shorted, the others being OK. So full of confidence we replaced the offending BY126, made sure there were no more shorts, fitted a new 2.5A fuse and switched on. On came the sound and up rustled the e.h.t., but with a spitting noise. BANG! There was a blinding flash of sheet lightning generally from the centre of the set.

The dog took off as usual, but the cat had known something was afoot and had left as soon as we switched on. How do they know? How much more of this can one be expected to stand?

Shaking from head to foot, I waited for my eyes to recover from the flash. Both fuses had shattered this time. Two BY126s had bit the dust. Don't panic I told myself. But I just can't help it.

"Can I have two HP7 batteries", asked the dear old lady handing me a pound note. I gave her change for 50p, and the dear old lady turned into a spitting and snarling Gorgon.

Oh dear. Can't I do anything right?

Now what about that spitting noise just before the explosion? With recent experiences in mind, I investigated the e.h.t. surround on the tube. Whatever it was, it wasn't nice and clean. So we made it so and cleaned off the lead and rectifier (no tripler, the transformer has an overwinding).

Out came the power panel and in went the BY126 replacements and fuses. Check to make sure that the diodes are the right way round – I'd fitted them and don't trust myself. I then disconnected the mains supply at source, switched everything else on, and retreated to the hideout where the mains supply control switch is. With the cat and dog. I next restored the mains supply, shutting my eyes and covering my ears.

The sound hissed on and a nice noisy raster appeared. No spitting noise, no lightning. Incidentally, I'm not kidding about the blinding white flash. That the air between the e.h.t. and the power panel can ionise to this extent is somewhat alarming, but I've seen such flashes before, even where there's been no e.h.t. to trigger it off, merely mains and h.t. Any comments?

We told Mr. Crabtree to move the set away from the window to avoid condensation (central heating, no paraffin stoves this time), and hope there will be no repetition of this unpleasant experience.

## Help!

We wanted something easy after this, so we started on a Thorn 3500 chassis which needed attention. The complaint was no results, funny whistle. Being of unsound mind, I decided that the power pack was at fault. But the spare was still awaiting attention with a queer fault around the monostable (I think) so I couldn't change it.

On switching on, the whistle started and so did I, taking voltages on the power pack. The 30V line was OK, but the 60V chopper line was down to 20V. I then wasted a lot of time as I wasn't thinking straight at all. There were lots of other things happening by now, and time was pressing. I decided to consult my friend Ray who has this irritating habit of being able to think straight.

"Hallo uncle Les" he said when I phoned him. "You in trouble?"

"Yes I am. I've got a 3500 that whistles at me."

"Does it? The line oscillator must be running at the wrong speed then, mustn't it? But you've checked that of course."

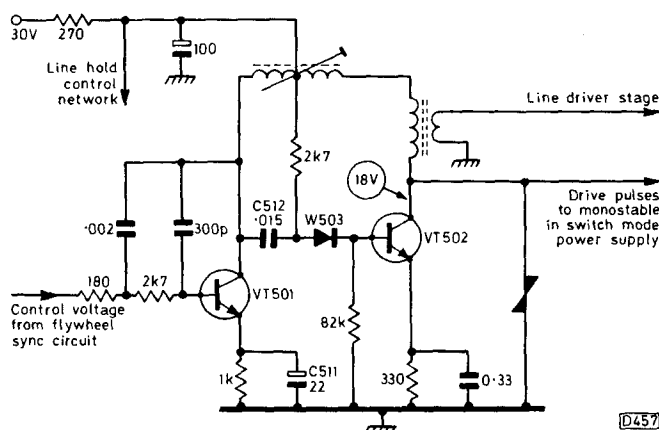


Fig. 2: Line oscillator circuit, Thorn 3000/3500 chassis. The output goes to the driver stage and also triggers the monostable multivibrator in the switch-mode power supply circuit. The trouble was no results, with a funny whistle. As a result of the tuning capacitor C512 going short-circuit, VT502 was excessively biased with about 10V at each of its electrodes.

"Er, well I was just going to Ray, but I thought I'd ring you to see if you're all right."

"Of course. Thank you Les. Oh, while you're there, Don wants to know the value of the resistor across the line linearity coil on an old Philips 210 chassis. Have you got the circuit?"

"Don't need the circuit Ray. It's a 1k $\Omega$ . Bung in a 2W one and keep it clear of the line output transformer winding."

"Thanks Les, bye."

"Thanks Ray, bye."

Line oscillator. Why didn't I think of that? It's so obvious. It's just that you get used to the power pack making funny noises.

Voltage checks showed that although the 30V line was OK, the line oscillator transistor's collector voltage wasn't 18V as it should be (see Fig. 2). The transistor was OK, but the tuning capacitor C512 proved to be a dead short. In went a replacement, and everything came back to normal as correct line pulses were now being fed back to the power pack. Easy. When you've got friends.

## And More Help . . .

We had recently repaired an ITT CVC5 chassis, fitting a new boost capacitor, a PY500 and a PL519, to cure (a) fuse failure when the boost capacitor shorted and (b) failing width after some hours' use. Now Mrs. Twintub had reported something very funny happening. Everything would be perfect for hours, then the sound and vision would go off leaving only a couple of vertical spikes in green and red, roughly in the centre and to the right of the screen. The fault would clear after a few moments, returning later. Investigation showed that the condition could only occasionally be promoted by disturbance of the main panel – but not in any particular spot.

So we spent some time resoldering the main frame tags to the panel at all likely places, on the assumption that it was bad earth returns that were causing the weird effect. This appeared to be successful, as disturbance failed to promote the condition. Several hours later however we were back to square one, with the condition never staying long enough for us to get any useful voltage readings anywhere.

Once more I felt panic gnawing away at my vitals.

The phone rang. It was our very own editor. What a nice man he can be.

"Hallo Les. Everything all right down there?"

"Well not really John, but I'll say it is just to be brave."

"Getting a nice lot of material to rave on about then, are you?"

"Yes but I don't know the answer to some of them and I don't like ITT any more." And before you could say knife I had poured out the whole sorry tale.

"Well now Les, we can't have you getting upset, can we? Spikes in green with red edges? Well, well, sounds like you're scoping a waveform, doesn't it?"

"That's it John, just like a waveform. But I'd rather have a picture."

"Don't worry Les, I'll phone you back later." And he did. Late in the evening, would you believe it? He's ever such a nice chap.

"Put the lights out Les, and when the fault occurs, look at the base of the line output transformer where the tags come through to the sub panel. You'll see a little spark, then you'll know what to do."

I did put the lights out, I did see a spark, and I did make good the soldering of the transformer's earthing tags, which are also used to earth the winding which provides the gating pulses. I did say "thank you" as well!

I get by, with a little help from my friends.

(The editor's face is red, and his legs are twisted like barley sugar. What an embarrassment this fellow Les is! It's our old friend E. Trundle who must take the credit here however, putting his finger on the cause of the trouble before I'd even finished describing it. Thanks Trudge!)

## Service Notebook

*George Wilding*

### *EW Tinting*

There are times when it's difficult to know what it is you've done that's cured a fault! Take the case of a Pye hybrid colour chassis we had in recently. The complaint was that the picture was severely tinted towards blue in a gradual manner from left to right, and it was mentioned that the fault had got worse over a period of weeks. On switching the set on, the fault was just as described and remained so even when the colour control was set at minimum. We switched off all guns to black out the screen, then checked each individually on the test card then being transmitted. Switching on the red gun gave perfectly even reproduction – and likewise with green and blue! Switching them all on then gave a perfectly good picture which required only slight adjustment to the first anode presets and the focus control for optimum results. Even after a prolonged soak test and repeated switching on and off there was no sign of the fault. Each first anode is decoupled by an  $0.02\mu\text{F}$  capacitor, so we're wondering whether the action of switching the guns off and on produced a spark that sealed one of them up.

The same fault, though not with the same severity, was present on another of these sets that came our way recently. This time our gun switching tests showed that the B–Y output was not being properly clamped – the chassis uses colour-difference drive. The most common cause of this is a marked change in the value of the clamp triode's  $8.2\text{M}\Omega$  anode load resistor, or alternatively a defect in the associated  $680\text{pF}$  coupling capacitor. The resistor seemed to measure about right, but replacing it along with the capacitor completely cured the EW colour drift.

### *Line Frequency Shift*

A sudden change in the line frequency does not necessarily imply the sudden breakdown or change in value of a component in a time-constant network. A defective diode or other component in the flywheel sync discriminator circuit, or in the following d.c. amplifier where one is incorporated, can produce similar symptoms.

We recently came across a dual-standard monochrome ITT set with a variety of line generator faults. The picture

would sometimes lock correctly, but would need hold control adjustment following channel change; sometimes line lock would be very critical; while on other occasions there would be such a marked change in the oscillator frequency that the hold control became useless. Changing the PCF802 line oscillator valve produced no improvement, so the two flywheel sync discriminator diodes were next checked. Both seemed to be o.k., but on repeating the test, since prod connection wasn't all that good, one of them appeared to be open-circuit. Inspection then showed that one end of it, also the lead of an associated resistor, were just twisted around a soldering tag, having apparently missed being soldered during assembly. On soldering up and readjusting the line oscillator coil, perfect line sync was obtained.

It was then found that the top push-button needed retuning after each operation, while the bottom one was so stiff to turn that optimum adjustment couldn't be obtained. These ITT u.h.f. tuners are far from ideal, the three-legged aluminium castings associated with each push-button plunger often developing cracks, causing mistuning after each channel change. Replacements can be obtained from ITT, but are tedious to fit. The castings were all right in this case, but only one spring was fitted to the catchplate. A similar but longer spring was found in our "nuts and bolts" box, and when this was cut down and fitted the mistuning of the top push-button was cured. The bottom push-button's stiffness was apparently due to it never having been used: normal operation was obtained on applying a little thin oil to the threaded push rod and then gradually turning the button in both directions.

### *Width Variations*

The trouble with a monochrome GEC set fitted with the Series One chassis was spasmodic slight but annoying width variations. Valve replacements made no difference, so attention was turned to the resistors in the width circuit as the next most likely possibility. The first suspect was R228 ( $10\text{M}\Omega$ ) from the boost line to the width circuit, but the spasmodic width variations continued after replacing it. The next suspect was the  $2.2\text{M}\Omega$  resistor R226 between the width circuit and the line output valve's control grid, and this turned out to be the culprit.

### *Contrast and Sound Level Variations*

The trouble with a Decca hybrid colour set was that the picture contrast and, to a lesser extent, the sound level spasmodically varied. The odds were against a tuner fault, since there was no increase in background grain when the

# Send in the Clowns

*Les Lawry-Johns*

YOU'VE probably gathered that we have some comical and sometimes strange characters in our neck of the woods. They keep on coming. Take Mr. Black for instance. Just about knee high to a grasshopper, but oh so aggressive.

"I want to see you" was his friendly greeting almost before he came through the door. "You know who I am."

"Of course Mr. Grey, I remember you well. How's your wife?"

"My name is Black and my wife is hopping mad, just like I am. I wouldn't like to be in your shoes if she cops alongside you."

So I had two hopping mad people on my hands and wondered why. I didn't have to wonder long.

"You repaired our set a few months ago and charged us through the nose just like all you people do and now it's gone again. Didn't make a very good job of it, did you?"

So saying he thrust a bill under my nose. It was dated eight months earlier and stated that a BT106 had been replaced along with a 3.15A fuse, convergence set up, etc. Charge, £5.60 plus 70p VAT.

"Six pounds thirty chucked down the drain. My missus went through the roof when it went off last night, and I got the blame. She's down the town now. Shouldn't be surprised if she hasn't gone to the advice brewrow like she did when the kettle blew up."

"Did they advise her to put water in it next time?" I asked, with genuine concern.

"Never mind about the kettle. What are you going to do about our telly?"

"Nothing. It's your set, not mine. It's up to you what you do. If you think it's so unreliable, what about a nice new one?"

We had a few words after that. Something about fifteen rounds and a duel at dawn, but it didn't amount to much. When he saw that I was not impressed with his aggression he dropped it like a cloak and the true reason for it emerged. He was scared stiff of his wife and would be glad of my co-operation to get her off his back.

Once this was obvious I was on his side. After all, when a bloke's wife is on the war path he needs all the help he can get. Don't we?

So we got the set in and had a look. Bush A823 or one of that ilk. Anyway, it was one of those with thermal cutout wirewounds as the load resistors of the three colour output transistors on the top of the decoder panel. I wasn't interested in the exact type, more in the fact that all three wirewounds were sprung open.

"What have you done Mr. Black?" I accused him.

"Me? I ain't done nothing. What's happened? Is it finished? She'll do her nut. Oh my gowd." Mr. Black looked bleak.

I wasn't feeling all that happy either. If all three resistors had overheated at the same time, all three must have been taken down to chassis at the same time. All three BF337 amplifiers bottomed at the same time? What was common? Well, one possibility was absence of pulses to operate the feedback clamps, since with no clamp action the three RGB amplifiers are biased hard on. The pulses do sometimes get lost due to a faulty connection in plug 3Z. The pulses were

there however. So what then? The tube? Oh no! Black day at bad rock, or bad day at black rock. More like picnic at hanging rock.

"All three Mr. Black. Not just one, not just two, but all three." Let him suffer too. I reached for the soldering iron.

"What are you going to do Les?" queried a now friendly Mr. Black.

"I'm going to solder them up and see what happens, 'cause I can't see why they all went together unless the tube's bugged or just messed about a bit."

On went the set and on came the picture. No trouble.

"Looks all right to me" said Mr. Black, his face still white.

I refitted the back cover and reflected upon the situation.

"Leave the set here for a few hours Mr. Black, and if it's all right it will prove my theory that there's a disturbing influence in your house causing peaks in the mains voltage and making things go wrong. Like the kettle and this, you see?"

"Must be my missus. I'll tell her that things will go better if no one gets excited."

So far so good. It hasn't happened since. If it was the tube, I wonder what would have happened if the earth returns and the spark gaps had not been in place and in order. A little more than sprung springs I fancy.

## *Mr. Bakewell's Pye*

We had to do some service calls on people who for some reason or the other were unable to bring their sets in. Mr. Bakewell was the first, and of course it just had to be a Pye 691 which had given long and valiant service but which is now nearing retirement age. The list of complaints about the set looked a bit formidable, but we plodded on through.

First it didn't work at all. Blown fuse. Short from top cap of PY500 to chassis. Shorted 0.47 $\mu$ F boost capacitor on line output transformer. No trouble. PY500 worse for wear. With both replaced, picture came on but with fault number two. Picture going yellow intermittently, which was blue drop out.

Check blue PCL84 base contacts and print. Solder up all suspect joints and rock valve. No results. Blue drive plug not making good contact in socket? Plug o.k. Tap tube base socket. Blue drops out with each tap. Clean up tube socket and pins. No more blue drop out.

Fault number three. Poor line hold. Turn up power unit. Reference pulse integrating resistor R203 (47k $\Omega$ ) turned to powder. Makes one wonder how there had been any line hold at all. Lucky this time: it often goes very low and blows the discriminator diodes. Everything o.k. Goodbye Mr. Bakewell. The next one was Mr. Winder the clockmaker.

## *Another Oldie*

Another aged set, but good. An ITT CVC2. Dead. Not really, as the valve heaters were glowing merrily enough.

Up on the top left there's a group of four fuses, and nearby is a wirewound surge limiter to the h.t. rectifier. Resistor open-circuit. We just happened to have a  $6.8\Omega$  10W with us, so in it went. The grey scale looked a bit dicey, and Mr. Winder said it varied over the evening. The red PCL84 seemed cooler than the other two, so we put in another and this seemed to do the trick. Not being sure, we said we'd call back later to confirm that it had. It had.

Two down, one to go. We thought. It didn't work out like that.

### *Mrs. Liquorish*

Go on. Laugh. There's more than one in the book. As true as I'm standing here waiting for this bus. Anyway . . . some weeks previously we had fitted a new line output transformer to the lady's Bush TV181S, due to a breakdown of insulation between the overwind and the yoke – not the DY802 heater winding this time. Now she'd phoned to say there was some sparking on the same side. In the event the transformer was not at fault. It was no more than a defective print contact to the PY88 base. Clean up, tidy up, no trouble. "I wonder if you could find time to call next door as they are new in this area and their set has broken down." Time was pressing but being a kind hearted cove I graciously consented to take a quick look.

### *Help from Wellington*

She was a pretty little thing but her set was a brute. A sloppy great red setter dog didn't help much either. With one foot in my tool box and another in the spares box he just stood there, tail wagging and barking his stupid head off as I struggled with the rear cover of the Decca Bradford.

"Push off you daft bugger" I bawled. "You're mucking up my whatsits." Kneeling down, I tugged at his feet and received a great wet tongue all over my face. Mrs. Lightfoot came to my aid and dragged Wellington out to the kitchen.

When she came back she told me that the cutout had cut out, or that was what her husband had said.

Armed with this information we checked for shorts and scored a bull's-eye straight away with a short from the top cap of the PY500 to chassis. Just like the Pye we thought. In this case the suspect capacitor is on the panel under the line output section, and is  $0.22\mu\text{F}$  1kV. Sure enough, a dead short. Our glory was short lived however.

Make sure there were no more shorts and switch on, pressing in the cutout which was still cut out you see. The valves lit up brightly and settled down. After a while the sound started to appear (sound) and the e.h.t. hissed away – but with sparks from the PY500. All off. Only one PY500 in box. Fit it and try again.

Up came the e.h.t., but with spitting around the e.h.t. connector cap. All off again. Clean around e.h.t. connector with silly stuff and try again. More hissing, this time from leads from top caps of PL509 and PY500 as they go down to the transformer. Not nice, rather brittle. Take all off, rake new leads from box and fit. E.H.T. now o.k., no hissing.

I was just leaning round to have a look at the screen when Wellington escaped from the kitchen and came lolling straight across to me. Bash. I put my hand out to steady myself and touched the top caps of the PL509 and PY500. Ahhhhh! I toppled over and landed on the dog, who naturally didn't take kindly to my weight. He struggled, I struggled. Mrs. Lightfoot dashed forward to save the set toppling over as I got off the dog who cannoned into Mrs. L who bit the dust. Chaos and confusion continued for a few

seconds, but order was quickly restored and Wellington was put out to graze in the garden. I found two white burns on my hands, but otherwise no harm had been done.

We could now see what the screen looked like. Decidedly green. It then became normal, before reverting to green. Surely not a poor tube base contact again? No, this time it was the green preset control VR296: faint sparking could be seen under the wiper. I searched through the spares box, but nowhere could I find a  $2k\Omega$  preset.

Not wishing to make a return visit, I decided to wire in two  $1k\Omega$   $\frac{1}{2}\text{W}$  resistors to simulate the preset set halfway, which was where it had been anyway. A slight touch up and Mrs. Lightfoot was satisfied. Er, that's to say she was satisfied with the picture, but if it was all the same to me could she have some sound?

I turned up the volume, but there was no trace of noise at all. My heart sank. Working on the timebases is one thing, access to the PCL82 audio output valve is another. Laying underneath the thing I could just about take some voltage readings – if I could remember the pin connections that is. I could remember that pin 7 is the screen grid and that this should have some h.t. on it. It didn't, although pin 6 (anode) did. My mind was by now becoming somewhat muddled. I could remember that it was a fairly high-value resistor, and I could see by the print where it lived. Did it die or was it killed?

"Mrs. Lightfoot. Would you turn the set off please?" She did. There were no shorts to chassis, so in went a  $10k\Omega$  1W resistor (should have been  $12k\Omega$  but never mind).

With the set back on there was plenty of sound with no distortion and the cathode reading on pin 2 seemed normal. So we concluded that the resistor had just died after all.

Time to tidy up and bid farewell to Mrs. Liquorish, Mrs. Lightfoot and Wellington.

### *Back at the Ranch*

After that lot you would think a little peace and quiet had been earned. Well maybe it had been earned, but we didn't get it. Mr. Goosey was waiting for me.

Now hang on just a second. This was not the Mr. Goosey that some years ago kept a pub called the Darnley Arms at Cobham (Kent). Oh no. You see, that Mr. Goosey had a next door neighbour called Mr. Gander. And what's more, Mr. Gander is still there.

Anyway, Mr. Goosey was waiting for me with his Philips G8.

"It's gone again. Same as it did before. What do you repair these sets with, dynamite?"

I managed a ghost of a smile at this dazzling display of wit. We had fitted a new tripler some months earlier, but doubted whether this was the cause of the trouble this time.

Anyway, off came the rear cover. The 3-15A mains input fuse was o.k., so the trouble was unlikely to be on the left side. Over to the right the 800mA fuse in the supply to the line timebase had gone.

Check for obvious shorts. None. Could be the tripler. Unhook it from the line output transformer. Hopefully stick in another fuse and switch on. Bonk. Not an immediate bonk, but a slightly delayed one. Leave the tripler off just in case, and remove the fuses from the supplies obtained from secondary windings on the transformer (saves checking the diodes etc.). Stick an ammeter across the fuse to see just what the overload is. 1.5A. Line output transistors warm when meter removed. Check transistor readings with base and emitter leads off. No leaks. Feeling sad now. Transistors could be breaking down under load, or

– continued on page 305

and again this is done by building a rechargeable battery into the decoder board.

A special tuner with a local oscillator sample feed outlet is needed, and the current U321 has been adapted to become the U321-LO. This has a coaxial supply outlet (at the top) which delivers a typical 33mV of local oscillator output at 75Ω impedance.

Although designed as a complete package, this system will interface with the Mullard remotely controlled teletext system. This too is a flexible system which has many extra features optionally available to setmakers by having them built in – to be discarded as desired. The handset keyboard can be made to operate in any of four modes – TV, teletext, Prestel and DICS.

### Plessey Tuning System

Like the Mullard DICS system, the Plessey Direct Channel Tuning system (see Fig. 14) is a frequency-synthesis system to dispense with the tuning resistor bank. Again, a stable 4MHz crystal controls a ROM programmed with the local oscillator frequencies of 70 TV channels. Again, by comparison with the varicap tuner a voltage is produced to correct any error and to pull the local oscillator on to the selected ROM frequency. Six i.c.s form the complete package, to which can be added the two remote control devices previously described.

A novel feature is the absence of a battery to keep the RAM information permanently stored. The memory chip is a CT1116, non-volatile MNOS memory (metal-nitride-oxide-silicon) which has gates made of very thin layers of oxide and nitride. If the gate is made negative with respect to the source and drain, a positive charge tunnels through the thin oxide layer and is trapped in the oxide-nitride dielectric. This stores

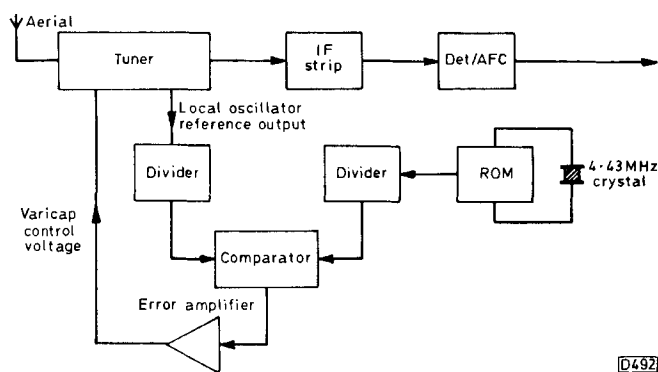


Fig. 14: Block diagram showing the basic principle of the Plessey direct channel tuning system. The local oscillator frequency is compared with the selected channel presented in digital form by the ROM, the difference signal being amplified and used to pull the local oscillator into lock.

the charge for at least 28 hours, and in practice considerably longer. To erase the memory, the polarity of the gate to source and drain voltage is reversed. This avalanches "hot" electrons into the oxide-nitride interface, neutralising the previously trapped charge. The method is known as "punch-through erasure". To read off the stored charge without erasing it requires an applied voltage which is midway between the negative charge and positive discharge potentials.

### Conclusion

We've come a long way since describing the advent of the varicap tuner. The TV set front end is getting steadily more complex.■

## Send in the Clowns

— continued from page 295

they could be on too long. Check R521 (4.7kΩ resistor in series with 0.0012μF capacitor C522 across driver transformer's primary winding – they are essential for correct drive pulse timing, as they damp the primary). R521 o.k. Suspect flyback tuning capacitors on top left of board, but seeing type fitted not really convinced that replacement would at this stage help. As the leads were off the BU205s it didn't take long to whip them off the heatsinks and plonk in a replacement pair – without much conviction that this was it. It wasn't.

"What is it?" queried Mr. Goosey.

"I'm not sure, but I think you need a new line output transformer you poor soul."

"Have you got one?"

"Yes."

"How long to make sure?"

"Ten minutes."

"I'll wait if you don't mind."

"I don't mind if you want to watch a right cock up".

Make a little sketch, just in case, and note direction of turns on 7 and 8. New transformer the same so proceed unsoldering etc.

"I wouldn't like your job."

"Neither do I at times."

In went the new tranny, back went the panel. Check current. Nicely low. Fit fuses. Nice hiss on sound. Fit tripler cap. Nice rustle up of e.h.t.

"O.K. Mr. Goosey. Now, about the bill."

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# Come back, come back . . .

*Les Lawry-Johns*

WE'VE just had the roughest patch for a very long time. I now realise that as a service engineer I'm a pretty good cowboy. Even so, most of it wasn't my fault . . . but some was.

## *An Ageing Ultra*

When Mr. Middlestump (initials L.B.W.) brought in his somewhat ageing Ultra 3000 because it didn't go, we thought it was going to be another quick job. It wasn't too easy, but then again it wasn't too bad – at the start that is. The tube heater was glowing, or rather the tube heaters were glowing, and there was plenty of h.t. on the body of the chopper transistor (VT604). Other than this, there were no signs of life.

Checking the 30V line proved that F602 was intact, the 30V was present and was being passed on to the line oscillator. R607 in the feed to the chopper driver transistor VT605 seemed to be warmer than usual however, so the voltage at its "low" end was checked and found to be 5V instead of 12V. Funny, we thought. Until this was cleared up there was no chance of the chopper being driven. So out came the power pack, after the usual struggle with the front hooks.

An ohmmeter check on the 12V line showed a low reading one way but a higher one the other. This didn't seem strange, but in view of the low voltage we thought it worth investigating. Moving the test prod from chassis to the emitter of VT605 showed a dead short whichever way the leads were connected, and in no time at all VT605 was out and another E1222 was fitted.

With the power unit back in the set the chopper started chopping or whatever choppers do, and all services were restored. A fair picture was displayed, and Mr. Middlestump was happy when he took his set away. He wasn't happy for long. He was back the next day. Sound, no picture: screen lighting up, purple. Examining the latter first, with the set on its side, we found the green output transistor's collector voltage high and this transistor proved to be open-circuit. In went another and the grey scale was restored, but of course still no picture.

So back along the line we went and finally ended up on the i.f. strip, set now the right way up. The final i.f. amplifier transistor VT104 turned out to be open-circuit. Replacement restored the picture and made the sound a lot stronger (it would have been much simpler had the sound signals gone right off, as they should have done, but they didn't). So there we were, all systems go. For a while that is.

We showed the picture to Mr. Middlestump and were just saying "nice, isn't it?" when the picture went completely blurred. Surely not the tripler? Removing the rear cover showed the focus lead from the tube away from its pin on the top right side. I was about to plonk it on when there was a sharp crack in the tube (I think) and the set went dead. The cutout had cut out. Putting the focus lead on firmly, I pressed in the cutout button. There was a hum and it pop-

ped out again. Frantic investigation showed that both R2009 line output transistors had gone short-circuit.

"Surely nothing else could have gone wrong?" said Mr. Middlestump a trifle irritably.

"It could, it has and I don't like it any more than you do" I said.

We wearily fitted another pair of line output transistors and carefully checked around to make sure that everything was in order. Back came the picture but the height was anything but right – and fluctuating in time with a queer hum which came and went. Voltages were varying on the field panel, and much time was wasted in this area. We then found that the 30V line was fluctuating between 40V and 45V.

Panic stricken, we turned to the 30V stabiliser transistor VT601 and accused it of having emitter-to-collector leakage. So we changed it: the variation continued apace. Unhooking its emitter lead should have killed the lot. It didn't. In fact the voltage went up. There was obviously a leak from the h.t. line, but where? Unhook this, unhook that. Red herrings came and went. Many were the bitter tears that fell.

Beary eyes scanned the circuit diagram and focused on the power unit. I had looked at the links from the h.t. rail to the feedback amplifier VT608 several times, but had stupidly not seen the relationship between W619 and W620 (see Fig. 1). If W619 goes short-circuit the 30V rail will be connected to h.t. via W620. Fool. A quick check on W619 proved that it was indeed short-circuit. Out it came and in went a replacement. 30V line steady. Height stabilised. Picture quite good.

"It's O.K. now Mr. Middlestump. I think."

"I wouldn't like your job" he said. "Fancy all that just because you left a lead off."

"I, I, er, oh well never mind." I gave up.

I thought (hoped) that that was the end of that one. It wasn't. However . . .

## *No Colour*

His name isn't Mr. Hoo actually, but he came from Hoo which is a fair distance from us and is on the Medway. His name was so unusual however that I just can't spell it.

Anyway, it was an ITT CVC5 or something like that and it had no colour. Ah ha, thought I, not going to get caught this time. So off came the back and up the top we went to ensure that the flip-flop was flip flopping (T36, T37). Sure enough, it wasn't. So back to the ident transistor T35 to see how this was faring. "Nice colour" said Mr. Hoo as I touched the test prod on the base of T35. So I took it off. The colour stayed. "Very good" he said. "How did you do it?"

"Blowed if I know" I confessed, thinking to myself that I must have prodded T35 into life thus starting up the 7.8kHz generator. This suggested that T35 was sluggish, so I changed it. Result: no colour.

All associated components were painstakingly checked,



and Mr. Hoo departed because he had a lot to do.

We then found that an electrolytic bridged across C205 (4.7 $\mu$ F) in the burst amplifier's collector circuit restored colour signals. That's it! It wasn't.

The temptation to rush round the decoder in a blind panic was resisted since the trouble was right there up on the top right side and was probably a dry-joint of some kind. But where? The burst amplifier transistor T34 next received attention. The voltages were slightly wrong, so the associated components were checked and the transistor changed. Full colour! Nothing would shift it. I thought (hoped) that that was that. It wasn't.

When Mr. Hoo came back we proudly showed him his glorious colour and off he went with many a yelp of pleasure. One hour later he phoned to say that he had no colour. He yelped with displeasure and said he would return the following day. I cried.

### *Enter a Jolly River Pilot*

"Mr. Lolly-Jones is it?" rubbing me up the wrong way to start with. "Harold said I'd find you here. Frankly I didn't know you existed till he told me over a pint. Anyway, I've a Bush colour set and it keeps going down to a thin white line or two across the screen every week or so and the buggers can't find out why. Harold said to take it to you and you'd sort it out in no time. Speedy Gonzales he called you. Ha Ha!" Bully for Harold. With friends like him you don't need enemies. So in came the Bush CTV1226 (A823B chassis).

Prodding around the field timebase caused the fault to come and go, but it wasn't till we opened up the panel and played with the pincushion phase coil 6L20 that the cause was evident. Resoldering the coil pegs cleared the trouble permanently.

"Well I never. Perhaps it'll be all right for a week or so, eh?"

"Bet you a pint to a brandy it'll stay longer than that."

It was not quite the end of the saga though.

"Oh, by the way, last night we kept getting a sort of morse code coming through on the sound. Perhaps you could have a quick look at the sound side while it's here?"

Until now I'd kept the sound down. Turning it up produced quite reasonable quality but with an edgy edge to it. After a short time the quality became worse and the thing started to motor boat. I touched the audio transistors and burnt my fingers. Spraying the BC126 driver transistor 2VT11 with freezer stopped the motor boating, but for a short time only. So I stuck in an equivalent and this got hot too. The voltages were haywire, and how, it produced reasonable sound beats me. Checking the output pair cold showed that they gave perfectly good readings, provided they were both npn types that is. *BOTH* npn?

Grabbing the circuit confirmed that the lower one should be a BC139 pnp transistor. The one fitted was an npn field output type 16039. My mind went numb. How long had this been in? Perhaps this is what is meant by bipolar... Now I knew.

Anyway, we stuck in a BD204 and everything ran nice and cool and there was no more morse code.

Looking back at the screen and changing channels, the faces went green.

"Oh that happens quite often. We just press the buttons in a couple of times and it goes right again."

Getting the faces to go green again, we reset the ident preset 3RV4 and tried it a few times. Now O.K.

Wrap it up and chat. "Thanks very much. Nice to have met you. See you soon. Goodbye." Very nice chap. His wife

was very nice too. Funny about that sound output though.

### *Back they Come*

The phone rang. Mr. Middlestump, and I felt my nerves cracking.

"We're having to watch this rotten set in black and white. After it's been on about an hour the colour starts flickering in and out and we're fed up with it."

"So am I. Why don't you find a good engineer?"

"I'll bring it in tomorrow. Perhaps it's only a little thing caused by that wire coming off. Cheers."

So we had a lovely day to look forward to. The ITT with intermittent colour and the 3000. Quite apart from the usual run of the mill heartache. Was tomorrow going to be the day when they would finally cart me off to the funny farm?

When it was time to get up in the morning I didn't want to. I wanted to stay there nice and warm and go back to sleep and not face these colourless colour sets.

The cat insisted that I got up however, so down we went to feed her, take the dog for his sniff around and generally do all the things everyone does at the start of the day.

### *Easy Ones*

The first set to be tackled was of all things an ITT. No signals. No transistor supply voltage. O.K. at the l.t. bridge. Not passing through the AD161 regulator transistor as its base voltage very low. This comes from T45 (BC170) which was also not being turned on. Check the reference voltage. Very low. Suspect the zener i.c. D11. Change to TAA550. All voltages now back to normal. Picture rolling, so change PCL805. Width in each side, so check drive to PL509. O.K. Change PL509. Done.

Bring on the next one. Thorn 8500, picture very blurred, suspect focus unit. Focus unit O.K. Low voltage at focus pin on tube, so check 100k $\Omega$  series resistor which turns out to be virtually open-circuit. Fit new resistor. O.K.

### *The Intermittents*

Enter Mr. Middlestump. Spirits fall.

On the bench there was very little colour signal and what there was was varying. We started on the decoder panel, which really was not a good place to start.

There was quite a bit of variation going on. We finally ended up at R306 (see Fig. 2), where there was quite a bit of variation. Now this is the a.c.c. line, so it seemed logical to check the associated preset R308 which could have been playing about. It wasn't, and the voltage at its slider was steady.

So back to the i.f. panel where the first chroma amplifier transistor VT110 lives. This proved to have base-to-emitter leakage, and once a new BF224 was fitted the colour signal was steady and the picture could not be faulted. Our spirits rose. To be quite honest we had spent some time chasing red herrings on the decoder panel, but we are learning, bit by bit, not to leap before you jump or something.

It appeared that Mr. Middlestump had finally been sorted out so it was one down, one to go — with Mr. Hoo.

The latter gentleman finally arrived, and we set to to sort out his intermittent trouble.

It needed only a finger on the base of the ident transistor T35 to cause some sort of colour bars to appear on the screen, so we had to conclude that the trouble was still in the circuit preceding this — the burst detector circuit. The coil, diodes etc. are in the top left can, and although we had

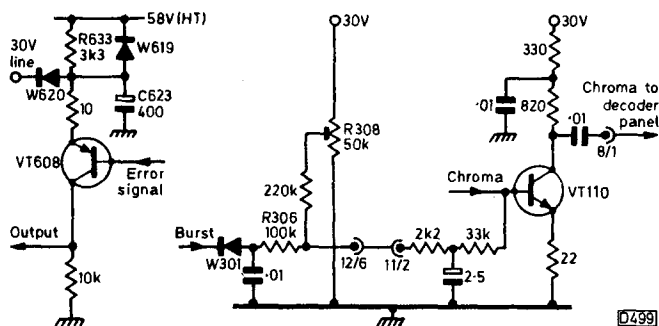


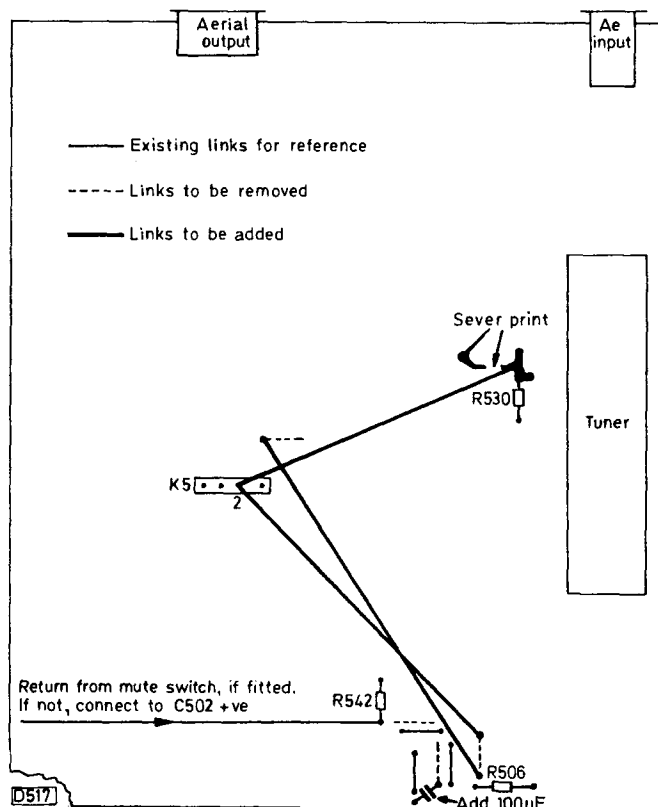
Fig. 1 (left): Power supply error amplifier circuit, Thorn 3000 chassis. W620 clamps the emitter of VT608 to the 30V rail. The time-constant of R633-C623 ensures that VT608 is cut off when the set is switched on, giving a slow-start action. W619 is included to discharge C623 rapidly when the set is switched off.

Fig. 2 (right): A.C.C. detector and first chroma amplifier circuits, Thorn 3000 chassis.

already had this off once – to check the diodes – we hadn't really attacked it head on. Now seemed the time to do so. Every connection on this small subpanel was checked and resoldered.

Upon reassembly we had the bistable happily sharing the voltages and the colour on the screen warmed our hearts. It didn't go off any more, so we had to conclude that no component had actually been at fault and that all along it had been a dry-joint in the phase detector even though all the connections had looked good. It was a good job the cat had got me up, or I'd have still been worrying about them. Now we have only the changing colour on that Decca to worry about...

## N1700 VCR MODIFICATIONS



The above layout should help those carrying out the off-tape monitoring modification suggested last month.

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# The Best Laid Schemes

Les Lawry-Johns

I WAS trying to find an irritating fault on a cassette deck and was engrossed in watching the busy little VU meter needles flickering up and down in time with the music coming through the headphones, which were keeping my ears warm, when this fellow came in.

## Communications Problems

I didn't like him very much. Intelligence wise, he was a cross between a cretin and a moron. His distinguishing characteristic was that he didn't bother to open his mouth when he spoke, which on the one hand showed decided lack of consideration for those expected to listen to him but on the other was of little consequence because what he did say didn't amount to much anyway. Added to this I did have the headphones on.

Ignoring the fact that I was totally engrossed with the job I was doing, he launched into a tirade of his troubles, at the same time keeping time with the index finger of his right hand. I didn't hear a thing, so just to be awkward I pointed to the headphones and then removed the jack plug from the deck. I showed him the plug, whereupon he took it and bawled into it as though it were a microphone.

Now that the music was off, I could vaguely hear bits and pieces of the gabble since now he thought he was talking into a microphone he was speaking far more (for him) carefully. Apparently he had brought this here stereo thing into us for repair some time ago, and now when he plays his record it sounds funny half way through. It's outside and he'll bring it in. He brought it in complete with his record, by which time I'd removed the headphones.

"Can you hear me without your hearing aid?" he shouted.

"Yes thank you, I need it only now and again."

"I'll leave it with you and call back at the end of the week then."

That isn't exactly what he said, but that's what it amounted to. After he had gone, I rigged it up with a couple of speakers and put the record on — at the far end of the bench so that I could get on with the cassette deck at the same time.

## Cat's Paw

It played away quite nicely, and I could hear no distortion at all — until it reached track three when the sound was decidedly distorted. Apparently the cat thought so as well. In one movement she leaped up on the bench and swiped the pick up arm with her paw. Zip.

"Spock, you horrible cat, clear off" I bawled.

Spock fled, leaving me to examine the record which was well and truly scratched from track three to the centre. My fault of course, but it was the first time the cat had taken a hand in the bench work for a long time. Enter the wife.

"What are you shouting at the cat for? Honestly, you make her life a misery. What's she done now? Damaged a

record? Is that all? Well I'm going to the record shop so I'll pick up one of these as well. A lot of fuss over nothing. You ought to be ashamed of yourself."

"Either that cat goes or I do."

"Wait until I get back from the town and then I'll help you to pack. Don't you dare kick her while I'm gone. I know you, you're evil." There's no justice in this world.

Actually she did get a new record, and track three sounded just as good as the others. Did he have only one record? She's a good cat really.

## The Fool on the Hill

I had a couple of outside jobs to do, so I packed my bags with care, slightly hampered by knowing only the make but not the model of the sets to be dealt with. One was a Murphy, the other a Pye, so there are no prizes for guessing the main content of my bags. Both calls were in the vicinity of Telegraph Hill, one actually on it.

The Murphy was the first one. It turned out to be the 110° remote control Z179 chassis, not one of my favourites so far. The complaint had been reported as "no sound or picture." Quite so, but the glass of the tube face was very much alive, and the tube heaters were glowing, plus the fact that there were very faint traces of shortwave stations issuing from the speaker. There was not the hiss that there would have been if the i.f. stages were working however. The left-hand signal panel can be released on the bottom catch and slid out to allow better access to the plug-in i.f. strip.

Playing with this revealed plenty of life at the output of the video processing i.c. (3C9503P or TDA1330) but no response from the input. Our spares box contained just about every i.c. except this one, so we promised to "pop back later with the bit you want."

Up the hill to the Pye. This turned out to be one of the 725 series, solid-state with vertical panels.

The bottom centre 800mA h.t. fuse had failed. This is in the feed to the line output stage. With the stupidity that seems to characterise my every move lately (senile decay), I thought I'd take a short cut and unhook the tripler. Sure enough the current dropped to about 500mA and a new fuse held. Our box contained almost every tripler except one for the 731-725 series. So we made the same promise and departed. Oh well, it was worth it just for the view from the hill over the estuary.

A quick nip back to base to pick up the (a) necessary and (b) unnecessary parts, delayed by people wanting to know this, that and the other. Eventually we were on our way back.

Whip out the Murphy's i.f. panel, suck up the solder on the chip, and stick in the replacement 1330. Lots of lovely sound and vision signals.

Up the hill to the Pye. Remove suspect tripler, fit new one. Switch on. No e.h.t. Fuse slowly gets red hot, curls up and dies. Realisation hit me. Idiot. Too stupid to take my

own advice (these pages some months ago, suspect C563 0.1  $\mu$ F 1.2kV under the focus unit, c.r.t. first anode supply reservoir, off the tripler). This capacitor was short-circuit of course, and had been isolated by disconnecting the tripler (it's at the earthy end of the line output transformer overwinding). Better by far to have removed the two-pin plug rather than the input to the tripler. Next time, next time.

Having restored what appeared to be normal reception by replacing the capacitor and refitting the original tripler, we stood back to admire the picture.

### **Tap and Tap Again**

"Oh, there's one thing you might see to while you're here. The picture goes off every now and again and we have to tap the top to get it back again." So we tapped the top of the cabinet and off went the picture (leaving the sound). Another tap brought it back. Here we go again.

Having slid out the left-side signal panel, every touch anywhere caused the picture signals to come and go. It appeared to be plug and socket connections, so each relevant one (and others) were checked with fairy fingers.

In view of the symptoms – sound unaffected but complete loss of luminance – we were inclined to dally around the delay line area. But as we prodded and probed, the fault became less and less easy to provoke. In short we were improving the contact without locating it, and time was a hurrying by.

A purpose had been served however, since only one item would now respond to light treatment. This proved to be the i.c. near the delay line (IC348, TBA560CQ) – it clips into a socket rather than being soldered to the print.

Out came the wee beastie (thus slightly altering the leg formation) and back in again he went. Inspecting the print side showed no sign of dry-joints or what have you, and no amount of vibration now seemed to disturb the picture.

Out again to admire the view, and then back to the traffic and the noise and the shop and the jobs.

### **Tube Trouble**

"Mr. Creaky has left his set here. He says that since you put the new tube in the picture is worse than ever. He'll be back at five o'clock to collect it." It was four thirty.

"You wouldn't like me to paint the Forth Bridge before five o'clock as well would you?" I complained.

"Well he did bring it in as soon as you went out, and you have been gone a long time. Mr. Creaky is very nice looking too."

I gave up and hoisted the G8 on to the bench.

The picture looked fine to me, for a while anyway, and then something funny happened. The whites started to have long pennants of orange streaking out to the right, which is typical of a failing tube. Off came the rear cover, back in went the aerial, and in the mirror the picture looked perfect. Whites were white with no streaks. Bitterly I wished I knew my job better than I did. Why can't I be quick witted and clever like most chaps I know? All I can ever do is plod on following dull routines that may or may not result in eventual success.

Self-hypnosis. That's the thing. I'll tell myself I'm clever.

It didn't work however, and I had only a few minutes left.

As I watched the crisp picture it started to play about again. This time it faded, becoming bluish in the process, and I heard a very faint clicking noise. The tube heaters were out.

Quickly (for me) I switched the meter to a.c. and applied

the prods to the heater posts. Full 6.3V. The tube heaters were glowing. Ah! A dry-joint on the tube base.

There weren't any. The clicks started again (from the speaker). Again the heaters dulled, and now the 6.3V reading was swinging. I fairly leapt over to the power panel to the tube heater supply plug. Moving it produced the clicks and the variation. Tightening up the socket stopped the hanky panky completely.

I now felt full of guilt. Had I put in a new tube unnecessarily? The old one was still in the basement. Checking it with the tube tester showed very low emission on all three guns. The poor heater supply contact must have occurred after the new tube was fitted. I was not guilty but I could have been, easily.

By the time Mr. Creaky came to collect I had also painted the Forth Bridge. I cannot understand these dull people who have no confidence in themselves.

The phone rang. It was Mr. Hoo.

"A couple of weeks ago you had a lot of trouble with my ITT because the colour kept going off. Well, it's gone off again."

Help!

Anyway we had the set in again, and this time had a look at the reference oscillator control loop's filter circuit. There's a 6.8 $\mu$ F electrolytic here (C208), and replacing this seems to have done the trick at last. I'm still nervous when the phone goes though.

### **Ghost Train**

Nothing to do with defective TVs, but it's worth telling. Now it's part of a river pilot's job to get up at unearthly hours in order to be at a certain place at a certain time – to pick up his ship. So our friend Clifford left home at 03.30, down to the pier where the cutter took him across to Tilbury where he intended to catch the 4.30 first train. At the station there was only a sleepy ticket collector.

"Purfleet train, platform 4" he yawned. Clifford looked over to platform 4. There was no train at platform 4 or for that matter at any other platform. In other words, the whole place was bare of trains.

"I thought it started from here" said Clifford.

"It does. It comes in last thing at night and it's the first one out in the morning."

"I can't see it".

The collector turned his head toward platform 4. He woke up with a jerk.

"Where's it gone?" he demanded.

"I haven't taken it" Clifford assured him.

The collector hot footed it over to a phone. Whoever was on the other end of the phone seemed as disturbed as the collector, and apparently accused him of losing the train. He banged the phone down muttering "It ain't my fault."

Just then two lonely figures came on the scene. It was the driver and guard, who were to take the train out.

"Where is it?" asked one.

"Don't you start. How do I know where it is?" said the unhappy collector. "It must have come in last night."

"It's bloody Fred, that's who it is. He just won't walk home last thing." Whereupon the driver and guard walked down the platform and into the darkness.

"Where've they gone?" asked Clifford, by now prepared to believe anything.

"Over to the sidings I suppose. Fred lives over there somewhere."

Sure enough, ten minutes later there was a rumbling on the tracks and the 4.30 slid into platform 4.

Clifford swears it's true, but you never know with him.

# Only in Dreams . . .

*Les Lawry-Johns*

WEARILY I clambered up the graceful curve of the Spit's port mainplane, once again to wedge myself in the tiny cockpit, to clunk-click the straps, and to prepare for the ordeal to come. I looked down on the strained and anxious faces of my faithful fitter and rigger, Fred and Reg, who had kept the Spit serviceable through the long months to enable this one plane, with its one pilot, to hold off the entire enemy air force by night and by day. I was feeling a bit groggy, after six months without sleep . . . Alone to keep the skies clear until replacements could be built and pilots trained to take my place.

"Be careful sir" shouted Fred. "They'll be coming at you out of the moon." My haggard face managed a ghost of a smile as I pulled up the side of the cockpit cover and pressed the starter. The sharp bark of the Koffman cartridge preceded the clatter of the Merlin as it burst into life in the early morning air, and the March Hares sat up in silence around the airfield perimeter, sole witnesses to what could well be the last act of the drama, their ears providing V signs of encouragement.

"Chocks away chaps."

"Chocks away sir, and good hunting. Oh God. He can't, he just can't. But of course . . . he must".

My headphones crackled into life. Dorniers over Dover, Junkers over Jarrow, Messerschmitts over Manchester. I pushed the throttle forward and the tiny aircraft raced across the grass. Make sure the guns are working. I gave the eight Brownings a quick burst, and the Vs disappeared from the March Hares' heads. No more for them the battle's noise. The engine screamed and the tail lifted . . . Screamed.

"Wake up, wake up. You're tearing the bed to bits. What dream is it this time?"

This was to be my reward then. To be rudely awakened by an unsympathetic spouse who knew and cared nothing about my valiant efforts to save our blessed island home.

I lay there reflecting for a while, the battle of the skies receding as I remembered what I'd done the previous day to my precious test cassettes, all carefully recorded. Correction. They had been carefully recorded until I'd left that open-wound transformer next to them while testing some audio stuff. For the life of me I couldn't find the reason for the loss of playback on the next cassette to be tested. I really must learn to be careful and logical like all those other chaps are . . .

## *Came the Day*

Some outside calls to make. Mrs. Acorn was first.

"I'm on the third floor, this end. The lift's at the far end."

Might just as well nip up the stairs at this end rather than drag all the way along to the lift carrying this lot and then drag all the way back again once I get up there and repeat the process on the way back.

So we danced up the first flight and then up the next to the first floor. Nip smartly up the next flight and round up the next to the second floor. Funny, it says first floor on the board. The first two flights had been up to the ground floor . . . Plod up the next two flights to the second floor. The boxes now weighed a ton and my legs felt a bit rubbery. Stagger up the next flight

and then the final seven steps which seemed like seventy. It was worse than this when we climbed Everest the first time though. But not a lot worse. At least we (the boxes and I) arrived at No. 49.

Mrs. Acorn was the chatty, worrying type, always thinking up reasons for doom and disaster and discussing them at great length to no real purpose.

"The set's in here. Do you think it's finished? I've had it only a couple of years. It should last longer than that, shouldn't it? Doesn't seem fair. The vacuum cleaner was the same. It all happens at once, and I do miss the telly. Half way through Cross Roads. I'm frightened to touch it myself. Always have been afraid of electricity, but I don't suppose you are. Neither was my husband, and he's dead."

By this time I'd reached the set. A 20in. monochrome one with a solid wood case. Unfamiliar. Unitra. Oh dear.

Back off, juice on and present at h.t. points. No heaters alight. Where's the dropper? Swing down chassis. Thermistor and large wirewound behind the e.h.t. compartment, upper right side.

Wirewound intact. Chase along to PY800. Open-circuit. Should have been a PY88 (PY800 19V heater, PY88 30V heater). Fit new PY88.

Heaters now alight, hissy sound. Aerial out of wall socket. Insert plug. No better. Redress plugs at both ends. Sound clear, but no raster yet.

Narrow picture slowly expanding after extended wait. Lazy PL504. Fit new one. Full picture now, but expanding when brilliance advanced. DY802 e.h.t. rectifier glowing o.k., but suspect low emission. DY802 not a DY802 but an EY86, with four turns on the heater winding. Look in vain for an EY86. Refit old one and promise to return later with replacement.

"Can I use it? It won't blow up, will it? Perhaps I'd better not have it on, but it's all I have and I do want to see the World at One."

"It's all right Mrs. Acorn. It's just that the picture gets bigger when it's bright, and I'll be back later anyway to stop that caper."

"All right, I'll get my little radio out, and you can do that for me, as well when you come back, and perhaps you could have a quick look at the cleaner as well."

I fled.

## *Ekco, Ekco*

They never come in singles, and it's a constant source of surprise that if you get a fault on one type of set the next one will be identical. After this you may go months before encountering the same fault again, even though the same type of set is met regularly but with different defects.

Next we had a 26in. Ekco colour set (Pye group hybrid chassis) which was a little too big for the customer to bring in. Symptom: sound, no picture. No valves heating. Whip out the PY500: open-circuit heater. Whip out the PL509: open-circuit heater. Check for shorts, none until PY500 refitted — it had a heater-cathode short of course, and since the PY500 is the second valve in the heater chain the first heater (PL509) is

also dealt a mortal blow. Extract new valves from spares box, fit, and ensure that all is well before departing. The following call required exactly the same performance, with the result that we are now out of PL504s and PY500s.

### And of Course

The last call was a little way out in the sticks. Ringing the door bell produced a loud barking by way of response. The door was opened by a friendly lady and the largest Old English Sheepdog I have ever seen. As far as his face was concerned, all that could be seen other than fur was a black nose. His feet were the size of dinner plates. More like a Yeti than a dog. He was friendly though. Even though he had no tail to wag, his rear end sort of undulated to show his pleasure.

"Get out of the way Saxon, you big slob" said Mrs. Norman.

We made our way to where the sick set stood. A large Philips G6. I was suddenly aware of what was not in the spares box.

I put the tool box down and grappled with the G6 to move it out. At the same time Saxon decided to sit on the tool box and I think he looked at me although I couldn't be sure. I then had to grapple with him to get him off the box, and he thought this was great fun and was in no hurry to give up his seat. Eventually I grabbed the box and got out the 4BA nut spinner to remove the rear cover of the set. Saxon was a great help, and did his best to distribute all the tools on the floor just in case I needed them.

With the set on, all the valves glowed and there was h.t. to the top caps of the PL509 and PY500 but no pulse voltage, the PL509 remaining cool. Check its screen feed resistor. Easier said than done on these sets. It proved to be open-circuit. The spares were out in the van.

"I'm going out to get a couple of bits and pieces. Are you coming?" I asked Saxon. He didn't need second asking and was ahead of me to the front door. Out we went to get the wirewound and the iron. Saxon jumped into the van and settled down comfortably.

"Come out you daft bugger, we haven't repaired the set yet." He didn't argue, and amiably followed me back into the house.

Now putting a new wirewound under the PL509 and PY500 valve bases is no joke, and as I wasn't inclined to put the set on its side I had to adopt a rather uncomfortable posture in order to solder the thing in. The trouble was that Saxon wanted to see what was going on as well, which made our heads too close for comfort, particularly since his was twice the size of mine and took up far too much space. Mrs. Norman came to my aid and dragged away my helper.

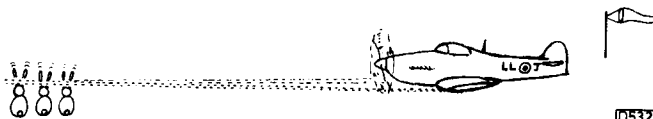
Eventually the resistor was in, and as there were no shorts present we tried the set, desperately hoping the PL509 was not going to play tricks. The resultant picture was quite pleasant, but rather soft and tinted due to the age of the tube precluding an accurate grey scale. I prepared to depart and the final pleasantries were being exchanged.

"The picture's gone off" said Mrs. Norman. Back to square one, with the wirewound overheating sufficient to melt the solder. The PL509 was faulty after all.

"Sorry Mrs. Norman, I'll have to pop back later. It needs something I had when I started out but haven't got now. See you later Saxon."

### Visit from a Reader

Back at the ranch we had a few bits and pieces to clear up before we could return to the scene of the uncompleted jobs. I'd just accidentally managed to short the base and collector



*A quick burst from the Brownings . . .*

of a regulator transistor in a reel-to-reel tape recorder, thereby returning us to exactly the same condition as when we had started (worse, as we now had no MJE3055: the last one had been the last one), when a couple of very nice people came into the shop to make themselves known as regular readers (she as well as he). As I say they were very nice people, but there was one odd thing: he was wearing a fur collar, not her.

"We thought we'd pop in to say hullo and just to make sure that you really do have a dog and a cat that do funny things."

"Oh yes. They're here all right. There's Spock, and the nose round the corner is Ben."

At that moment I took another look at the fur collar and it yawned at me. It was a dog. "She was getting tired you see." The dog was elegantly draped around his neck and for all the world looked like a fur collar. What a lovely lot of daft readers we do have.

### Came the Night

We had discharged our responsibilities to the letter, and had recharged our batteries at Harold's hostelry before retiring for the night, the better to slumber rather than lie fretting into the early hours . . .

It was a freezing cold morning as day dawned. The lone Swordfish stood, ungainly as ever, freshly loaded with its single torpedo, and only one occupant instead of three.

Lt.-Commander Prangham-Wright nodded to me briefly as I clambered up the lower port mainplane, the starting handle in my icy hand.

"The entire enemy fleet is proceeding up through the straits — two carriers, two battleships, four cruisers and ten destroyers. They must not be allowed to get through, or all is lost. Not one. I must press home my attack with the utmost despatch."

"But this is our last aircraft sir, and that's the last torpedo" I stammered, at a loss to see how he could sink the lot in one go.

"No one knows that better than I" said the intrepid naval officer. "I've had the armourers up all night specially hardening the warhead so that it'll penetrate anything up to nineteen ships and explode on impact with the last — just in case they have a supply ship tucked away. All I've got to do is to get 'em in line and dive the old stringbag at 100 knots at the first one and the lot will go down *wham!*" What a wonderful man. What ingenuity. What courage. No wonder he had the D.S.O. and scar.

"Right Les, wind her up and we'll get going."

Standing on the leading edge of the mainplane, I inserted the handle into the socket behind the engine and commenced the winding up process. Slowly my frozen hands rotated the handle to get the flywheel moving, then faster and ever faster until the flywheel was up to speed. "Switches on." "Switches on." I removed the handle and pulled the ring which would bring the spinning flywheel into marriage with the engine. Clatter, clatter, clatter. The big three-bladed airscrew turned and stopped as the engine coughed and died.

"You bloody fool, you didn't get her up to speed. Do it again" bawled Prangham-Wright. "And this time put some backbone into it."

Warily I reinserted the handle, and with aching muscles started to wind her up again. Faster and faster, faster and faster. The flywheel was screaming, screaming . . .

# Midsummer Madness

## Les Lawry-Johns

I WAS busy making out a list of spares needed to top up the shelves, making sure to get the order code right for each item and frightening myself thinking of the probable cost, when this young lady walked in.

"We're doing a survey of small radio, television and electrical businesses, and I wondered whether you'd mind answering a few questions?"

"Not at all my dear. Fire away. I bet a pretty girl like you has to answer a few questions herself in the course of a day or, er, oh well, carry on."

So the questions came thick and fast. What type of appliances do we sell? What brands? Which sell best? What percentage of our turnover is the result of sales as opposed to service, and so on. Then came the question which stopped me dead in my tracks.

**"Would you say you're slack in the summer?"**

I looked at her for quite some time, gravely pondering the question and a suitable answer, during which time her face became bright pink.

"I wouldn't say we are more slack in the summer than in the winter, but. . . ." At that moment my beloved's voice floated down the stairs.

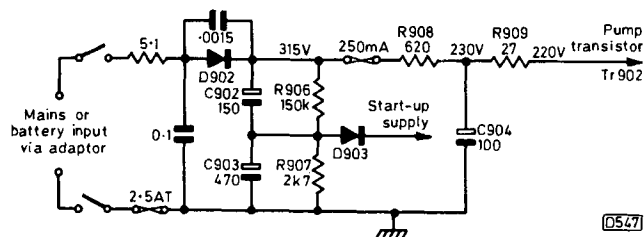
**"He's slack all the year round, don't let him fool you."**

Seeing that she had an ally, the young lady regained her composure and put a tick against No Slack Period.

The rest of the questions were dealt with without embarrassment, and she departed in good spirits.

Hardly had she gone when another female appeared, carrying an orange Indesit T12LBG, orange apparently being the favoured colour for these popular portables.

Apparently it had failed altogether, but prior to this it had suffered from intermittent loss of signals, the screen remaining bright but blank. The cause of the non-operation wasn't too difficult to trace, since the voltages appeared low (not absent) – the 15V line was only about 7V. Since there was no sign of overheating we suspected an open-circuit electrolytic and were inclined to pounce on C902 (see Fig. 1). It wasn't until R908 was bridged however that the whole thing came alive (the low voltages had been due to the start-up circuit). A new 620 $\Omega$ , 18W resistor was fitted and a



*Fig. 1: Mains input/h.t. rectifier circuit used in the Indesit T12LGB portable. R909 is a fusible type in later production. A problem we've had on occasion is the h.t. filter capacitor C904 going open-circuit: the symptoms are a small picture after a slow tube warm up, with the h.t. line low at about 7-5V. R906/7 provide a 5-8V start-up supply to get the line oscillator going.*

nice picture was obtained with a piece of wire stuck in the 300 $\Omega$  aerial input (too lazy to fit the 75 $\Omega$  adaptor).

This didn't last long however. The sound and vision signals then suddenly cut out, leaving a bright screen. We spent some time checking through the i.f. stages, getting nowhere because we hadn't studied the circuit of this and had assumed that the collectors are fed from a positive rail with the emitters returned to chassis. Close inspection revealed that there should be a  $-11V$  negative rail as well, for the emitters, and that this was absent. Switching the set off and then on again after a brief period restored the signals, and the negative voltages were present. These vanished quickly, so we were left to find out where they went.

Their source proved to be the line output transformer, negative-going pulses being rectified by D909 to provide the negative line. When D909 was sprayed with freezer it obligingly came to life, as did the i.f. strip. A new diode put a stop to these pranks and the Indesit settled down nicely. For a while.

It then again cut out completely, and investigation showed that the voltage on C904 was sky high, with nothing on the collector of the pump transistor TR902. This time R909 (27Ω, 5W) had become open-circuit. R909 and R908 (on the lower centre heatsink) are both suspect on this chassis, and even if they are not faulty it's prudent to check their contacts as these tend to corrode over a period.

### ***Double Filter***

We've had a few all solid-state Bush monochrome sets in lately (Model TV309 etc., A816 chassis) with varying troubles. One in particular is worth mentioning, to save a few minutes for our all too busy readers.

Dick Dix brought one in the other day with a shattered supply fuse.

"Won't take a minute Dick, it's bound to be the mains filter capacitor."

The fuse is on the control panel, together with a hefty 0.47 $\mu$ F 1kV filter capacitor. There was a dead short across the capacitor, so out came the panel and off came the capacitor – only to find that the capacitor was in mint condition and that the short was still across where the capacitor had been.

The mains leads go from this panel over to the right side of the main board, and there of course resides 3C67 which is an 0.1 $\mu$ F 600V type of the more suspect kind. This was the culprit, and it was speedily replaced with a more reliable one of 1kV working.

It was then necessary to refit the front control panel which needn't have been removed in the first place. Next time we'll swing out the main panel first and check the  $0.1\mu\text{F}$  capacitor instead of wasting time on the control panel. If I remember, that is.

While this was going on, Dick was practicing his deplorable French on the cat. "Ze cat sat on ze mat" he pronounced slowly and with perfect diction. Spock was clearly not impressed. She stretched out one leg and yawned.

“Wait a minute Dick” I said helpfully. “Shouldn’t it be Ze cat zat on ze mat?” Dick looked thoughtful and was about to try again when my beloved came on the scene (she never misses any conversation that’s going on, even if she’s ten miles away and it’s whispered).

"Neither of you have the slightest idea of you're own language never mind French. Anyone knows it's, La cad, sad on la mad."

We both looked at her with renewed respect.



"Tray bong" she said and vanished as quickly as she had come.

"Well I never" said Dick, "Well I never".

Seeing me refitting the rear cover of the Bush, his thoughts came back to the job in hand.

"Was it what you thought it was?"

"Well, yes and no really. About six months ago, a chap brought one of these in for the same thing. I thought it was on the control panel and took it out only to find it was over the other side after all, and I've just done the same thing."

Dick shook his head in awe.

"You must have a mind like a computer. It's a pity you can't put it down on paper like some people do."

### **Laura Lovett's Dicey Decca**

When Laura phoned to say she had frame collapse I was ringing her bell before she had put the phone down. After all, Laura's frame was not a thing to be taken lightly and if aid was needed mine would be first. As soon as she answered the door I could see that it was not her frame that had collapsed. It was just as I remembered it from last week, when she kept getting red.

"Sorry to bother you again so soon. It's getting naughty lately isn't it?"

"The neighbours will start talking if I keep on popping in like this" I suggested. . . .

"Oh, I don't think there's much fear of that. Not with you anyway. Now if it was that young telephone engineer, they'd have grounds to talk."

I never did like Laura very much really, and I could feel in my bones that this was going to be a more expensive repair than when she went red which was only a faulty green output transistor. These women needn't think they can twist me round their little finger like they can some of these telephone louts.

It was a Bradford chassis with valved timebases. I switched it on and within a short time the picture came up as right as ninepence.

"Oh dear" said Mrs. Lovitt, and went red. "I hope I haven't got you here on a wild goose chase. It really did go down to some lines across the middle, honestly it did."

"It's probably a touch of the tantrums" I diagnosed with knowing nod.

"I think it's wonderful the way you engineers can put your finger on it right away."

"Some of us are better at it than others" I admitted. So off came the back cover. Tap the PL508.

"That's it" she said excitedly.

Off set, out PL508, in with another, switch on.

"Still the same."

"You have to give it time to warm up, it's no good rushing things." We gave it time but it didn't open up so I tapped it and it did. Moving the PL508 produced the same performance, so I had to conclude that we had a poor contact on the print side of the panel. Set off, remove panel plugs, release the top three clips and remove panel.

Taking my glasses off so that I could see properly, I peered at the panel in the vicinity of the PL508's base and immediately spotted the poor contact.

I remembered from last time that the nearest mains socket was nowhere near the set. Actually the nearest socket was in the bedroom (believe it or not), through a sliding door in the wall where the TV lived. "Can I go through and plug the iron in?"

"I'll put it in for you, you had trouble finding it last time."

(Editor's note. We had better condense the rest of this

story. Suffice it to say that the job was completed to everyone's satisfaction.)

### **Meanwhile**

I was feeling a little fragile when I got back to base, and was not at all in the mood to tackle Mr. Gagg's G8 which, according to him, had nothing wrong with it really. It was just that it kept jittering from time to time, changed colour once or twice an hour, while the picture would become grainy on the odd occasion.

"It's four o'clock now" said Mr. Gagg. "Shall I call back at 5?"

"Make it 5.30 and bring twenty quid with you. You might get some change, but don't bank on it".

"What could be wrong to cost all that money this time?"

"I'm not sure, but the jittering could be a faulty thyristor, the changing colour a duff BF337 transistor, and the grainy picture could be a tuner unit fault which could mean an exchange tuner unit as they are difficult to repair – for me anyway."

"Good Lord, I didn't think it would come to all that. Last time when it packed up altogether it cost me only a few pounds, yet this time when it's still working it's going to cost a lot more. Funny."

"Not really funny Mr. Gagg. Last time it was just that long black thing with tags on it, and they don't cost very much. Anyway, I might not have to replace the tuner unit, but if you definitely want it ready by 5.30 the chances are I will".

"Well that bit of it's not too bad. Just do the jittery picture and the change of colour. That'll make it easy for you won't it?"

"Thanks Mr. Gagg, we'll do just those bits then. See you later."

As soon as he had gone, the landlord from one of the local pubs popped in carrying a radio-cassette deck (Sony stereo) which had apparently drunk (unwillingly) a pint of bitter and a glass of sherry. By its appearance, it had absorbed considerably more than this.

"Don't you keep it covered?"

"Are you supposed to?"

Believe it or not, he wanted it for six o'clock that evening.

As he was going, in came a lady from over the way.

"I am fed up with buying two 996 batteries at a time, at over a pound, for this radio. Can you fix me up with a mains adaptor? I'll be back when I've done some shopping."

Incredibly, she was followed by a chap with a Philips battery operated record player.

"Can you fix me up with a mains unit? I'm fed up with buying six SP2 cells at 17p a time."

Oh dear, I thought. I wish I hadn't lingered at Laura's. After all it was only a dry-joint that had been troubling her.

I really was out of favour with the Gods that day, because the 'phone rang and it just had to be her.

"My frame's all wobbly and I'm afraid it will fall. You must have left it loose." I swear I hadn't touched the frame on which the set stood. It just rolled out and back on its casters and seemed firm enough. Can't argue though.

"O.K. I'll shoot over as soon as I shut the shop."

"What was that all about?" asked my little sun flower who had just finished putting little crosses all over a picture of a football pitch.

"I've got to go out again when we shut the shop. Laura Lovitt's legs are loose. Er, I mean her frame feels fragile. Er, oh I don't know, I'm proper fed up. I wish I was a telephone engineer."

# All Slog and No Grog...

*Les Lawry-Johns*

THERE'S absolutely no rest for us busy boys lately. Even when we finish you can bet your life some joker will spoil your pint with "I don't want to bother you, but...". You escape from that and settle down at home with a bite to eat and a quick glimpse of the telly before bedtime and the thing changes channels all on its own. So you give up and go to bed and dream about sets that won't go right or women that won't go wrong or something. Look at yesterday for instance. It started with colourless sets.

First an 8500 (Ferguson) with the complaint that the colour had been intermittent but had now gone beyond recall.

## *Dealing with Lack of Colour*

I suppose we all have our own pet ways of making a start when tackling faults that can have various possible causes. I always like to start on this one by proving the presence of timing pulses from the line output stage. These are applied to connection 3/2 on the decoder panel on the 8000 series chassis, and can be measured at TP9 in the burst gate circuit. Finding little activity here we nipped smartly over to the timebase panel and had a look at TP28, which again was lifeless. It was a short step from here to R404 (33k $\Omega$ ) which was found to be open-circuit.

Nice going we thought. Keep it up and we might regain some of our lost confidence which has taken a bashing lately due to persistent wrong diagnoses, er diagnostics, er, jumping to the wrong conclusions, with the consequent hours lost plodding toward the right conclusions.

## *And the Next Gent Please*

Of course the next case just had to be loss of colour again. Apparently Mr. Earlybirth had had a spot of trouble with his Philips G8 of late, and was dissatisfied with the service he had received from the original suppliers of the set. He produced massive repair bills to prove it. Horrific would perhaps be a better word. Since the last one was very recent and was incurred in the quest for lost colour, I suggested that he returned the set to the repairers for their approbation. "I'm too scared" he said. "It'll probably be a hundred quid this time." I couldn't quite see how this could happen, but as he was clearly adamant about not going back with it I didn't press the point further.

"O.K. Mr. Earlybirth, leave your phone number and we'll ring you when it's sorted out."

Clearly this was one to approach with caution. It was one of the separate panel type, and it was obvious that some work had been done on both the signal and the decoder panels.

So we decided to cut across the usual routine and fit a known good decoder panel which we just happened to have lying around. With this in there was still no colour, so we did something daft. We refitted the original panel and then checked for the positive and negative pulses at pins 8 and 1 respectively at the rear edge connector. The negative pulses were there but there was no joy at pin 8 (TP39). So over we went to the timebase (line scan) unit and checked at pin 1 of

plug U. Nothing here so follow the track along to R576 (4.7 $\Omega$ , or 4R7 if you like that better). It didn't look well, and indeed proved to be open-circuit. A replacement of the same small wattage did not overheat, and the positive pulses were now present on my little diode probe.

Sadly however there was still no colour (and I hadn't left the colour control turned down like I did on that one some time ago, chasing all over the place before I realized it).

So out came the decoder panel again and in went the test one. Full colour. Suspecting hanky-panky, we looked with care at the removed panel. The core of the reference oscillator coil looked decidedly out of place, whilst all the other cores were still sealed. So back went the panel and careful adjustment to the suspect core restored almost normal results except that the grey scale was out and the picture was too bright with the brightness right down.

Resetting the blue d.c. level control R297 restored normal brightness, and a touch up on the green and red level controls restored the grey scale to very nearly perfect. All that remained was to converge the set. This was easier said than done, since R1933 on the convergence panel had seen better days. A new 10 $\Omega$  potentiometer put this right, and we were quite pleased with the result.

"Mr. Earlybirth. Your set's ready. Bring a couple of hundred quid with you, ha, ha."

It was a bit premature really because I suddenly became aware that there was no sound when I turned it up to hear what the tennis scores were (I can't read).

The rear cover had to come off again, and the sound returned on its own. This proved to be nothing more than a poor contact on the audio plug, so we weren't all that upset.

Put the back on again, having wangled the control knobs through, and that was that. We didn't really sting him. He got change from three fivers, and was happy.

## *Only No Sound*

"Not a lot wrong" he said. "Not a lot. Just no sound." As this was an ITT CVC5, it came as no surprise and of course we made straight for the PCL86. Giving it a quick clout with a screwdriver handle restored the sound with a sharp crack. In went a new valve and we waited for the sound to burst forth. It didn't. Applying the voltmeter, we found rather more h.t. than we expected. Not too much voltage you understand, but what there was was in too many places.

As usual, my mind went completely blank. I knew I should have h.t. on pin 6, the output pentode anode, but I couldn't remember what pin the screen grid voltage should be on. So we had 200V on pins 6, 8 and 3, and 100V on pin 9. Looking it up, we should have had 200V on pins 6 and 3, but pin 8 was the control grid. Not to be bothered with niceties, the valve was whipped out and the voltage on pin 8 vanished. Another duff new valve, but what had happened to the cathode bias resistor? Nothing apparently. It still read 120 $\Omega$  and the 50 $\mu$ F decoupler was also in one piece. Another new valve restored the sound.

"While you're at it" said Mr. Ratchet (christian name I presumed was Paul, as it said P on the job sheet), "you

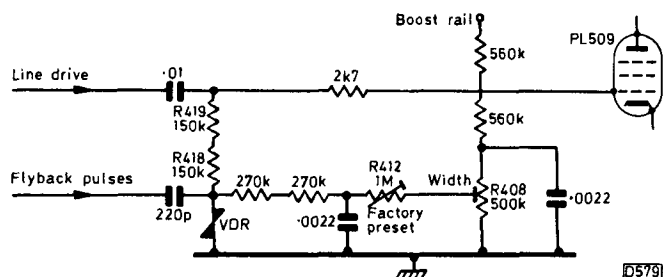


Fig. 1: The width control circuit used in the ITT CVC5 and subsequent hybrid colour chassis. The design is conventional, but care has been taken over its implementation. Pairs of resistors are used to reduce the voltage stress across the individual resistors, and the 0.0022µF decoupling capacitors are included to protect the factory and dealer preset width controls against high pulse voltages.

might have a quick look at the picture as there's a line down the left side." There was indeed. It looked like brushing of some sort, and the width only just made it. Just to put us on the wrong track (tracking?) there was a sharp crack of discharge from inside the line output section.

Off came the screening and we peered suspiciously at the tripler and focus assembly. Nothing seemed out of place, and the discharge did not recur. Bearing in mind Eugene's good advice from earlier in the year, we looked hard at the line output transformer subpanel for signs of dry-joints etc. Everything seemed in order.

Looking again at the picture, the line scan did not seem all that even. We concluded however that once the left side dribble was cured everything else would fall into line as it were. For want of something better to do, we changed the PL509. This made matters a damn sight worse, so we changed the PY500 as well. This didn't alter things at all.

Since the width was only just making it, we reset the "dealer width" control R408 (see Fig. 1) which didn't do anything. Neither did the "factory width" control R412, which seemed most peculiar. A meter applied to the PL509's control grid showed that there was adequate drive, and incidentally shot out the width. "Ah ha" we said (not being able to think of anything better).

So off went the supply and we got down to checking the resistors in the width circuit. All seemed in order until we came to the series resistors R418 and R419. They should have been something like 150kΩ each. R419 read o.k., but R418 didn't read at all. A new resistor in this position enabled us to set up the width correctly, with a nice even line scan and no dribble.

"Took a long time to find that, didn't it?" commented Mr. Ratchet. "My name's not Trundle" I protested (sorry Eugene). "My name is the one over the door and I am a well known ditherer. Always have been and it's a bit late to change now. If I was any good at this job I wouldn't be doing it." Now there's a profound thought. I must think about that.

### So the Day Wore On

Just for a change we thought we'd have a go at a Ferguson audio effort. "Won't play the records it won't." This was a relief, as we'd had a bit of trouble of late with the cassette side of one of these and didn't relish another bout for a time. BSR deck, funny noise, and dead slow on 45 r.p.m.

Take off the turntable and clean up the centre post and bush. Rough up the idler wheel, and a drop of oil into the top motor bearing. Reassemble and check. Nice, quiet and

only slightly fast on the strobe (as usual). Switch to 33. Turntable stops. Do it again. O.K. on 45, stops on 33.

Take off turntable and check on idler wheel. Clunks nicely on to the drive spindle on 45, doesn't want to be pulled across fully on 33. Conclude that there's friction on swing spindle in the 33 position. Oil and try again. No better. Take out unit and check on nylon assembly and notice that swing arm has to come down a shade out of its true position which would make the idler contact the motor spindle. Why? Don't know.

Note that there's movement to spare on the assembly when in the 45 position, but none in the 33 position (determined by a nylon ratchet rotating the cog teeth of the nylon speed selector drum). Think. "If the ratchet is pushing the cog drum too far round, why not move it back one tooth?" Ease out the ratchet and allow the drum to advance one tooth. Instant success. Now plays 33 as well as 45.

Question: how did the ratchet and cog get out of sync in the first place? Never mind, plod on.

Think about calling it a day and cashing up. Not difficult as there is no cash in till other than that wrested from Mr. Earlybirth and Mr. Pawl, sorry Mr. Ratchet. Will have to reduce fluid intake until our monetary affairs improve.

### Later

We had only a couple of halves, and that was spoilt by someone wanting to know something I didn't know anything about. And so to bed.

Funny it keeps changing channels like that. I'll have to see if it's the i.c. Never mind. Think about it tomorrow. Wonder what I can chat about in the next article? Twenty five years with the September issue, seems only yesterday.

Thirty years ago: wrestling with old prewar Cossor 1210 with the funny sync separator. Two top caps at 90 degrees, one for line, the other for frame (not field then). Bloody great 15in. tube.

Thirty five years, thirty six or so ... I can still hear the boys singing Lily Marlene.

"There's a desert squadron  
Somewhere in the blue,  
No one there that matters  
To tell 'em what to do.

About nine miles this side of Alexandria, well past the stinking tannery, is a small village called Fayid.

We had an airfield there, right on the Med, only the coast road between. Our main war effort was making sailing dinghies to play with out in the bay on our make and mends (afternoons off). Fleet requirement unit they called us, 775 squadron.

### And so to Sleep

There was a panic on. The skipper was going barmy. He called Sub-Lt. Thompson in at the double.

"Listen Thompson. Something's up. Jerries are flying Ju 52s across to Benghazi carrying secret loads of I don't know what, but the army's going mad and the Admiral has been on the blower. He wants 'em shot down. Trouble is they're not ordinary Ju 52s, they're Ju 52Ms. The M is for metal. Bloody great lengths of corrugated iron right the way along 'em.

Machine guns are no good, 20mm. cannon shells are deflected back and shoot down or own Seafires - deflected back by the grooves of the corrugated iron. Only one thing to do. We've had a 70mm. gun mounted on a Hurricane and that'll knock a hole in anything. The recoil when the

thing goes off will knock you back a hundred knots, so you must go in at two hundred to avoid stalling.

We know your reputation for missing the target every time Thompson, but this time you mustn't miss. All the other pilots have shot themselves down."

Sub-Lt. Thompson,  
Second in command,  
Couldn't find the target,  
Too much bloody sand.  
He dropped all his bombs out in the blue,  
Too bloody true, and so would you.  
If you had seen Benghazi,  
If you had seen B.G.

So off went our hero, out into the blue, flying the Hurricane burdened with the enormous gun.

Approaching Benghazi, he could see the distant speck of the three-engined Ju 52 out over the Med. He could see other flying things as well. Large birds called Shite Hawks, wheeling about the sky, hungry for prey. Peculiar birds. The only ones that fly in herds. Lots of cows and only one big bull. He was so wrapped up in what was before him that he didn't see what was behind. An Italian Macchi 42 was slowly coming up astern.

The Ju 52 came lumbering in over the coast line as our Subby closed in to attack. He could plainly see the corrugated side of the big jerry transport looming large.

Before he could get into the firing position, he saw the transport dropping its secret cargo. Hundreds of cones falling, each with their little parachute. Cornets from the toe of Italy. So that was it. Cornettoes. What a devilish scheme, seeing that allied troops held Benghazi at the moment.

They bomb Benghazi every night,  
And when they're not,  
They're getting tight.

He fired his mighty gun. Crash it went. Bash came the recoil, and the Hurricane practically stood still. Unfortunately, the Macchi had closed up for the kill and couldn't avoid hitting the Hurricane. Bang, they went.

The impact shot Subby Thompson clean out of his cockpit, and he'd forgotten his parachute. Whizz he went, through the crisp North African air. The big Shite Hawk saw his chance and moved in, grasping Subby firmly in his enormous talons. The 70mm. shell tore into the Ju 52 and down it went. Boom. The tangled mass of the Hurricane and the Macchi spiralled into the sea off the coast. Leaving our hero suspended as usual by Bull Shite.

### Footnote to a Previous Epic

Footnote to the saga of Lt-Commander Pragham-Wright who attacked the whole Italian 7th fleet in the Straits of Messina (see July issue).

Nineteen ships were sunk that day by one torpedo. The twentieth ship was rammed by the lone Swordfish, whose pilot was heard to shout just before impact "one more for the pot."

We've had several enquiries, you see.

### NEW TELEPART CATALOGUE

The new 152-page Telepart trade catalogue, listing over 5,000 items, is now available from Willow Vale Electronics Ltd., Old Hall Works, Arborfield Road, Shinfield, Reading, Berks. (Telephone: Reading (0734) 884444.)

## next month in

# TELEVISION

### ● COLOUR RECEIVER OPTIONS

Most constructors who embarked on the colour receiver project we started a year ago should by now either be receiving pictures on their set or be very close to finishing construction of the basic receiver.

Next month we start on the various options mentioned earlier in the series, starting with the addition of teletext reception facilities. For this purpose the Texas Instruments XM11 teletext decoder module is used, together with a very simple interface board and an inexpensive cable linked keypad. This approach provides the simplest possible solution to the provision of teletext, and the whole thing can be built and working within a matter of hours.

In subsequent issues we will describe how to add remote control to the basic receiver: this will be followed by the ultimate option, the addition of teletext and remote control – the remote control system operating both the receiver controls and the teletext functions. This last option will enable constructors to build a receiver which compares favourably with up-market commercial sets.

### ● SECAM COLOUR

Following our feature on receiving French TV this month, we thought it would be a good idea to take a look at the way in which the French colour system (SECAM) works. Keith Cummins describes the system, its pros and cons, and reports on his observations of the results off-screen.

### ● TACKLING MAINS/BATTERY PORTABLES

With their need to be able to operate from a 12V supply as well as the mains, portables present their own problems. A dead set can be a very dead one indeed – no signs of life at all. John Law describes how to tackle this sort of problem, with particular reference to the Thorn 1590/1591 chassis.

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By using this circuit, the size of the complete reactivator can be reduced quite considerably – the one I've built fits into a plastic box measuring only  $2 \times 3 \times 3\frac{1}{2}$  in. A piece of equipment this size will fit easily into a standard tool box of course.

C.S. Wood, Ossett, West Yorkshire.

### AMATEUR TV

Perhaps you would bring to the notice of your readers the amateur TV fraternity in Britain, represented by the British Amateur TV Club?

Amateur TV pictures are transmitted on 436.5MHz, using mainly 625-line negative modulation. For reception, a fairly common system is to use an ELC1043 tuner with 2pF capacitors added across the varicap diodes and the tuning lines pressed closer together to increase the sensitivity, feeding the output to the Band I tuner of a dual-standard set. Using 10V of peak r.f. power, TV pictures can be received at 10-15 miles with this receiver system.

If any of your readers in the Reading, Berks area are interested in amateur TV, a demonstration could be given.

I wonder whether any readers know of any circuits for improving the line sync with weak signals, as this seems to be a major cause of picture degradation?

Amateur TV pictures can be transmitted using a class "B" amateur radio licence. For further details, write to the Radio Society of Great Britain, Gt. Doughty St., London. Steve James (G8LCL), 21 Lind Close, Earley, Reading, Berks.

*Editorial comment:* We're only too pleased to draw readers' attention to the BATC. For membership details, write (enclosing s.a.e.) to Brian Summers (G8GQS), 13 Church St., Gainsborough, Lincs. Telephone Gainsborough 3940. Several of our regular contributors are members of the BATC incidentally. We don't generally give much attention to amateur TV activities in this magazine for the simple reason that the BATC has its own quarterly journal which covers the field thoroughly.

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# Up the Family Tree

Les Lawry-Johns

I WAS busy wondering what to do when a vaguely familiar figure walked through the front door (she didn't bother to open it). "Hallo Leslie" she boomed. It was auntie Tessa. A formidable figure and an ex-hospital matron, so you didn't fool around with Tessa. "Hallo Tessa, how nice to see you after all this time. You do look well. How is uncle Ben?"

"Oh dear" said Tessa. "I thought we'd informed everyone. He passed on in June. Fancy you not knowing."

"I am sorry Tessa, you must miss him terribly. Mind you he'd done well. Must have been about eighty or so I'd have thought."

"He was eighty four, and I'm seventy now you know."

"Well I never, I would never had thought it" I ventured.

"What about you? Must be knocking on a bit yourself, though you don't look it. How do you manage to stay the same?"

"Well, it's easy really" I said modestly. "I always put my socks on standing up you see." (The magazine cannot accept responsibility for the consequences of following this advice. I tried it – Editor.)

So we exchanged other pleasantries and Tessa departed, being only on a flying visit and having to see other relatives before bouncing off back to Barnstable.

When she had gone, I pondered upon the passing of uncle Ben. He was the last of four sons and one daughter (my mum). All had been characters in their own right. For example, uncle Jeff had no time for dentists. He would have his tooth ache like most other folk, but his solution was to have a drink (more than usual) and pull the molar out with a pair of pliers, swearing and cussing everything and everybody in the painful process. Uncle Fred solved his problems with an open razor, whilst Uncle John was the bravest of all. He married aunt Lil.

It was Grandad who towered over all though. Albeit small in stature, his heavy black beard and uniform stamped him as the pirate he was at heart. Earlier he'd been first

mate of a two-funnelled winkle barge; later he became the skipper of a ferry boat, and for many years had criss crossed the Thames on the ferryboat Rose. He was sometimes on Edith, to the intense annoyance of his wife Matilda.

### Navigating Techniques

His one deep secret was his failing eyesight. In short, he couldn't see, which was somewhat of a drawback since the Thames at that time was an extremely busy waterway. We concluded however that he had his own method of navigation which did not require good sight, because he had a wonderful record of accident free crossings. This he shared with his opposite number skipper, old Jewiss, who by chance was the Grandad of my friend Ernie (landlord of a pub if you remember from a previous article). Accident free that is until one night Grandad hit the Tilbury landing stage an almighty thump which shook the Rose from stem to stern and didn't do the landing stage much good either, not to mention the passengers who were convinced that they were about to meet their maker while most were totally unprepared to do so.

Grandad said it was foggy at the time, which seems a pretty poor excuse if you can't see anyway. The upshot was that he had to have a medical and parted company with Rose (and Edith).

Uncle Jeff said it was a pretty poor show, and it was obvious that the medical examiner didn't know what he was talking about as none of them did. Grandad retired, and mum had to go across the road to get his beer for him because it was dangerous for him to cross the road, not being able to see and all that.

All this was a few years ago now so I don't suppose it's of any real interest to you. I just thought I'd let you know I had a grandad (two as a matter of fact) that I can still brag

about, even if Ernie reckons his grandad was a better ferryboat man than mine.

## From Russia with Love

We are getting a bit choosy in our old age about which sets we take on for repair. For example, we are not keen on tackling Rigonda portables. So when one is brought in we immediately think who we can unload it on to.

Two came in last week, and we suggested to both owners that they should take them to someone who kept the spares. For example our friend Geoff who has a shop in Moon Lane.

Within the hour Geoff was on the phone.

"Do you happen to have service sheets on these little Rigonda portables Les? Some rotten bugger told them to bring 'em to me". The penny dropped. "It wasn't you was it?"

"No Geoff. I wouldn't do that to you, you know that. As it happens I do have the sheets. Funny regulator in them Geoff, sort of like an AD149 with three legs. See you when you pop down old mate".

I mean, what are friends for? What's the point in getting older if you don't get crafty with it.

## Another Portable

I got my come uppance with the next portable though. It was a Ferguson 3840, with the 1690 chassis, and was wanted for five o'clock that afternoon as it was shared by the crew of a tug and they were going on at six and expected a quiet night.

The regulated line was a bit high, because the line output stage wasn't drawing any current. The efficiency diode was intact and read right. The supply was present at the collector of the line output transistor, and this made us feel uncomfortable. Not because the voltage was there and the transistor wasn't functioning, but because it was a T6006V (BU407) and we didn't have one.

We consoled ourselves by thinking that maybe it wasn't being turned on by the preceding driver or oscillator. With the solder removed from the base and emitter it seemed perfectly good on the ohmmeter. So we checked for line drive when it was resoldered. There wasn't any (should be  $-0.3V$  base to emitter). Checks showed that the line oscillator was functioning and that line drive was present at the collector of the driver transistor, though damped. "Ah ha" we exclaimed as we leapt to the wrong conclusion once again. C86 could be leaky ( $0.01\mu F$  damping capacitor in series with the  $82\Omega$  resistor R89 from the collector to chassis). It wasn't.

"Oh dear, not the transformer" we panicked.

"Don't be daft, it can't be the driver transformer because we haven't got one." The logic of this was beyond question, but. "We haven't got a BU407 either."

What are friends for? Frantic phone round. "Sorry Les." "Sorry uncle Les." "Sorry Lawry."

Alone again. Up the creek without a whore, er oar, er, paddle. Are we to be defeated? Don't answer that.

Make a conclusive test. That's it. What have we got? Lot's of line output transistors for the bigger stuff. Disconnect the BU407 and hook up an R2008A. Why not?

Instant success. Nice raster and the right sized picture with the aerial in. No heatsink though, and the R2008 was running pretty warm. Decide to improvise one rather than drill the existing one which also carries the regulator transistor. The correct transistor can then be fitted as soon as we get it.

So there it was with two heatsinks for the next couple of days. It worked well. I wonder if the new BU407 will last as long as the R2008 would have done if we had left it in? We'll let you know in due course.

## A Lesson Here Somewhere

Enter a local engineer. "Hey Les, you don't happen to have an Indesit T24 line output transformer do you?"

I had one. "I've got one left. Let me have the replacement as soon as you get it will you?"

"I'd rather pay for this one if you don't mind."

"Oh, all right then."

One hour later. "Can you fix our Indesit? There's smoke coming from where the metal box is." Frantic phone calls. "Sorry Les." "Sorry uncle Les." Phone suppliers. "Certainly, we'll put a couple in the post for you. You should get them in a couple of days".

## Enter an Anxious Man

"I borrowed this set from my sister because our colour set went up in smoke. The picture went off after a few minutes however. She says it's down to me because she spent twenty odd quid on it only a couple of months ago, so it shouldn't have gone wrong again and it must be me."

I had a sinking feeling that this was going to be awkward. It was a Philips G24T300 or something. You know the one, single-standard version of the 210 series chassis.

"It could be the line output transformer."

"That's what she had replaced."

"Oh well, it shouldn't be that then, should it?"

It shouldn't have been, but it was. The line output transformer was obviously fairly new, but a bit more than a couple of months I would have thought.

I told him that these things are guaranteed and that he should get his sister to contact the person who had fitted it. He looked scared. "Can I use your phone?"

Although I was six feet away I heard the reason why he looked scared. He put the phone down with a shaking hand.

"My sister wants her set back tonight and it had better be in going order." It was a shame to see such a big man reduced to jelly.

So I put him in my last 210 line output transformer and charged him only what it cost me. Away he went, confidence restored, fit to fight another day. Funny how women frighten us isn't it?

Of course, only two seconds later in comes a Philips 210 which wanted a line output transformer and no one around had one. This sort of thing used to happen with triplers until those darling people at Anglia Components brought out their universal tripler unit which has made life a lot easier. Now that we are well armed, tripler trouble seems to be less frequent than it was . . . Wouldn't it be nice if there was a universal line output transformer?

## A Lovely One

The next set to come our way was yet another Philips one, a 24in. monochrome set fitted with the 320 chassis. It had a really lovely (?) fault. Now as you know this is the all solid-state chassis, with a bridge rectifier feeding a thyristor which provides a regulated h.t. supply of about 160V for the line timebase and the video output stage. As you probably also know, the regulated power supply doesn't deliver its full output until the line timebase starts up and in consequence the 34V line appears. If the line output stage is not working

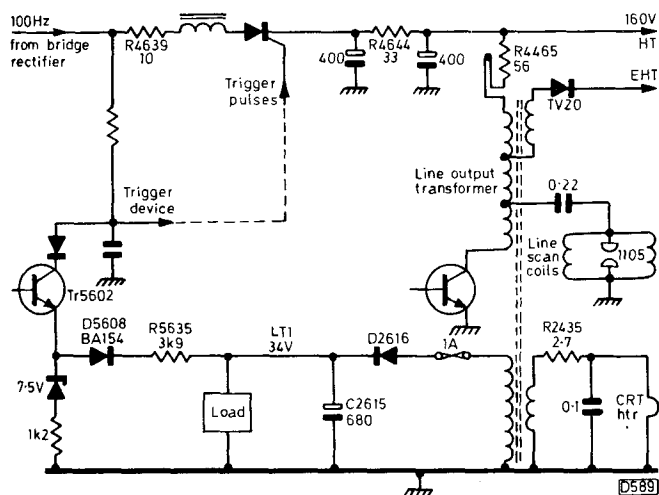


Fig. 1: Simplified circuitry showing the interconnections between the power supplies and the line output stage in the Philips 320 solid-state monochrome chassis.

or the 34V line is not intact, the h.t. line drops to below 100V (see Fig. 1).

We found the h.t. line was at 100V, with the 10Ω surge limiting resistor R4639 and the 33Ω smoothing resistor R4644 running too warm for comfort. The 34V supply was practically non-existent at the fuse for that line – fuse was intact, with virtually no current passing – and we thought that the line output stage was inoperative. In fact it was operating however, and a spark could be drawn from the exposed cone of the e.h.t. stick. This meant that the stick itself was o.k. and the line output stage functioning, but not well enough to produce the 34V line. Together with the excess h.t. current (overheating R4639 and R4644) this suggested an overload on the line output stage, but not one sufficiently severe to open the 56Ω spring resistor R4465 which supplies it.

We spent some while bumbling around until we finally unhooked the line scan coils. Immediately there was a vicious spark from the d.c. end of the e.h.t. stick, through the plastic housing. Off went the set, and we turned our attention to the scan coils – to be immediately burnt by the small spark gap (1105) wired across the line tags. Removing this and reconnecting the coils, we set the h.t. regulator to minimum and then turned on again. Everything now functioned, but not very well of course as the supply was low.

Turning up the control with a meter on the h.t. test point, we achieved 155V before the e.h.t. cracked over from the stick base. Inserting another layer of plastic solved this one, and we were then able to get full size and enough heater glow to provide a respectable picture.

Another spark gap was fitted across the coils, and the set seemed to function well enough except for a rather subdued tube heater glow which resulted in a slightly extended warm up time. The series resistor R2435 was correct at 2.7Ω, and since the heater supply winding is on the line output transformer and the rest of the line timebase functioned well we did not pursue the point, having already spent a lot of time chasing the shorted spark gap.

It was not the end of the story though, since we'd been testing on one channel selector only. When the others were checked, we found that three of the six were inoperative.

Since these were the top three we opened up the unit (Philips six-latch type, as used on the G8) and found the top plastic broken away on three of the selector strips. The top latches act on the top loop of each strip only, the lower three engaging in the loop half way down. So it was possible

to interchange the strips and render all latches fully operative and tunable.

## A Bout with the Baron

I do wish people would keep their mouths shut. They've only to mention something to me and I'm blown if I don't go and dream about it. Someone was having a go at me recently because I wrote about my dreams of World War II. "Well I never" they said, sarky like. "I'd have thought at your age the first World War would have been nearer the mark". Not being quick thinking, I couldn't conjure up a suitably cutting reply. So I just drunk my beer and said nowt. But come night time I had a very queer dream.

There we were on an advanced airfield in France, lovingly tending my Sopwith Camel. Fred, Reg and me. And while we worked we sang our favourite song:

Four and twenty virgins  
Came down from Inverness  
And when the ball was over  
There were four and twenty less.

Suddenly our song was cut short, as a speck in the sky grew larger and zoomed over our field. It was a red Fokker D8 triplane, almost certainly flown by the dreaded Prussian aristocrat Baron Von Poorhoven. He seemed to throw his hand down at us before roaring away – not even attempting to shoot us up.

We ran over to the hand and found it to be a gauntlet with a note attached. It read: "up your soppo Camel." It was a challenge not to be ignored. So we prepared our trusty aeroplane and filled it full of this that and the other, singing away with renewed vigour:

The village butcher he was there  
Chopper in his hand  
He swung his chopper round and round  
And circumscribed the band.

Fred fitted and Reg rigged. Fred finely fiddled the engine until it sung a sweet song, and Reg rigged the airframe until the flying wires could be played like a harp. Perfection was the aim and perfection we achieved that day in Flanders. I donned my Didcot and helmet and wrote my note with care.

"Up your Fokker triplane" on one side, "0500 Somme" on the other.

I took off and skimmed across the trenches, ignoring the ground fire, but was slightly worried about Big Bertha lobbing shells toward Paris as I gained height for my run in at high speed across the Baron's field. I saw him standing there, looking upwards as I zoomed in, a mocking look upon his face. His scarf billowed out in the breeze, the red a bright contrast to the green field and perhaps an omen of what was to come . . . Blood.

Red and green, red and green. The blue was missing. I had to find why the blue was absent and it had to be done by five o'clock or Mr. Forth would make me paint his bridge again. I leapt out of bed. It was 4.30.

"What on earth are you up to now?" enquired my ever considerate prairie cactus.

"I've got to fight the Red Baron at 0500 and the blue's missing and, and . . ."

"What did I ever do to deserve you? It must have been something bad. Fight the Red Baron! He'd have to catch you first. Get back in bed and try not to snore and jump about."

I crept back in bed and lay there quietly while she snored and jumped about. Probably dreaming about mixing up two Yorkshires at once. These women have no imagination . . .



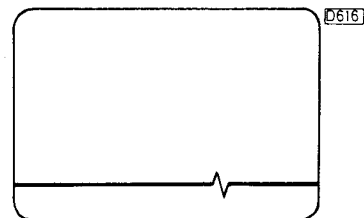
flywheel sync/line oscillator circuits were replaced, but the fault persisted. I then decided to take a look at the sync separator circuit, which is on the i.f. panel. It turned out that the high-value ( $4.7\text{M}\Omega$ ) bias resistor R33 between the base of the sync separator transistor and the 205V line had gone open-circuit.

The other fault was on a Thorn 1500 chassis which displayed a perfect picture except that approximately two inches from the bottom of the raster two or three lines were paired, with a peculiar small kink which looked like a triangular pulse about three-quarters of the way along the paired lines (see Fig. 4). The culprit turned out to be C37 ( $64\mu\text{F}$ ) which couples the video signal to the base of the video output transistor. It seemed all right on test however, charging up perfectly via an Avo 8 on the times 100 range – a nice, smooth steady climb to  $10\text{M}\Omega$  or thereabouts.

D. Hewitt,  
Havant, Hants.

*Editorial note:* The high-value resistor is included in the sync separator's base circuit to ensure that it's driven to saturation by the sync pulses. The trouble given by the video coupling electrolytic capacitor could possibly be due

Fig. 4: Unusual fault condition experienced on the Thorn 1500 chassis. Linearity otherwise perfect.



to its inductance – or has anyone any other ideas on this one?

## PYE SOLID-STATE COLOUR CHASSIS

Further to Mike Phelan's comments on the Pye large-screen solid-state colour chassis (731 etc.), I've found that a leaky field output transistor (VT688) can cause a very rapid reduction of the scan down to two-three inches, with a linear scan. If the field scan reduces in this way, check the field output transistor's heatsink: if the temperature is high, the transistor is suspect.

S. J. Humphreys,  
Welwyn, Herts.

# Don't Ask Why

Les Lawry-Johns

WHEN women start asking questions, they never stop. Take the other night for instance.

"Why is it warmer in the summer than in the winter?"

Now I'm not going to be taken in by a simple question like that. There just has to be something behind it. But I thought I'd play along.

"Because the earth tilts and we see more of the sun up this end. In other words, it comes up earlier and goes down later and they see less of it down South America way, until it's our winter and then it's their turn to see more of it and we see less, you see."

"When do we start seeing less of it?"

"Oh about the middle of June or something – you know, the longest day."

"Well, if we see less of it after that, why does it always seem warmer two months later, in August?"

"Er, well, you see, by then the sun has warmed up the places which were cold when it arrived. So whichever way the wind blows, it's always warm until these places start cooling down again. Say in September, when it starts getting a bit nippy. Something to do with Arctic Terns so they say."

"So the best time to buy a new coat is in the Autumn then, say about now?" I might have known. So I thought it was my turn to ask silly questions and during the day, instead of concentrating on the work, I was trying to dream up something daft.

## It's All Yellow

It was a Thorn 8500 chassis with the complaint of "previously changing colours, now all yellow" (i.e. no blue). So naturally we leapt at the blue output stage to see whether the voltages there could tell us anything. They couldn't. The base, emitter and collector readings were more like those in

the red and green stages than they were themselves . . . well, you know what I mean. They couldn't be faulted. So we leapt where we should have leapt in the first place, to the tube base, and checked the first anodes. If anything, the blue first anode was slightly higher than the other two. Check the cathodes we said, and did. Instead of being high, the blue cathode voltage was slightly low, which should have meant more blue on the screen.

My mistake of course was not looking in the mirror when I took the readings. But I had my glasses off to peer closely at the meter, and when I put them back on to look up the test prod was no longer on the blue cathode.

To my befuddled mind it now seemed that the tube had lost emission on the blue gun, so I bugged on the tube tester. Not too good it said, but not too bad either. About the same as the green and red guns. What more do you want?

I was rapidly getting fed up, and when my honey bunny asked what I wanted for lunch I snapped nastily "a turkey egg".

This was it, the daft question I'd wanted since last night. "Don't be silly" she said. "Whoever heard of a turkey egg for lunch?"

"I'll have it tonight then."

"Don't be stupid, you can't buy turkey eggs."

"Why not? There are millions of turkeys around doing nothing until some bank holiday – except gobbling food and making funny noises."

"Well I've never seen them for sale. You deserve beans on toast."

So back we went to the 8500 and its missing blue. This time I happened to look in the mirror as I took the voltage readings on the cathodes. Red o.k., green o.k., blue slightly low and the screen became blue and remained so until the meter prod was removed.

Moving back to the output transistors, the blue collector was correct and the meter made no difference. Obviously the choke between the collector and the tube's cathode was open-circuit. It wasn't. But there was no continuity from the choke to connector 7/3 which takes the blue drive to the tube. My bleary eyes couldn't see any crack in the print, but a jump lead restored normal working.

Voltage readings can be misleading if you don't look in the mirror at the same time to see the effect of the meter on the circuit. The trouble with looking in the mirror of course is that you stand a chance of seeing yourself peering over the top of the set. Then you know just how dozy you look when you're trying to concentrate. Not a pretty sight.

### **More on the Pye Hybrids**

Every time we look round there seems to be a Pye 691, 693 or 697 needing attention. One caught me nicely the other day. It came in for "wrong colour". This was putting it mildly. The grey scale seemed reasonable enough, but when the colour was turned on it was horrible beyond description.

Checking the PCL84 colour-difference output valves didn't produce much joy, although one was definitely low-emission – and leaky to boot. A check on the 12k $\Omega$  pentode anode load resistors then revealed that two of the three were open-circuit, which was a promising start. We were out of 12k $\Omega$  wirewounds of course as I'd forgotten to order any, but as we seemed to have plenty of other values we decided to fit three 10k $\Omega$  resistors and see what the picture then looked like.

At first sight it didn't seem too bad, but when the colour was turned up much the newsreader's face turned green and looked decidedly sick due to a horrible hum bar. So we checked the earthing of the panel, screening of leads, and everything except the right thing of course. We had already checked for the presence of clamp pulses at the yellow plug on the CDA panel – only briefly, in view of the fair grey scale. In the end we took a closer look at the d.c. clamping, and found that although the pulses were arriving at the yellow plug there was a poor contact between the socket and the series capacitor C372, thus leaving the triodes virtually unclamped. With the clamping restored, we could turn up the colour and only maximum contrast would produce hum bars of any mention.

### **Another Silly Question**

We had to call on Mrs. Allnutty whose Doric was dicey (no raster). The line output stage was overheating, and this proved to be a faulty tripler. Whilst we were struggling to fit the new one, Mrs. Allnutty carried on with her decorating and was engaged in mixing paint, or rather was preparing to mix some. She had a fine tin of white satin gloss which she tipped into a large tin. As she did this, she chatted.

"I'm not keen on brilliant white paint. I much prefer a touch of colour, and I do like a very delicate green tint in the white to contrast with the Avacado. Trouble is, I'm right out of green paint. Do you think this emulsion will mix in all right?"

You could have knocked me down with a feather. Mix emulsion with paint?

"You can't do that Mrs. Allnutty. They just won't mix, and if they do they'll separate afterwards. Oil and water you see."

"What do you mean, separate afterwards?" Mrs. Allnutty asked in a worried voice.

"Well, if you painted that door with it, the white would

go to the top and the green would go to the bottom, so you'd have a two toned door."

"That sounds a bit daft to me" said Mrs. Allnutty. "I painted the door and skirting in the other room with it yesterday, and it's still all right."

"It might be all right now Mrs. A" I explained, being an expert on telling my wife how she should decorate our own place. "You wait until er, well, you wait. They don't call me Lowery for nothing you know."

"Well I'm going to mix it, and I'm going to paint the woodwork in here with it like I did in the other room, whatever you say."

She did. And it looks all right.

### **A New Servicing Hazard**

Jeff phoned the other day to acquaint me with a hideous new aspect that's entered upon the servicing scene. You know how touch tuner channel selectors and their attendant circuitry can often present problems due in some part to the high impedances involved? Obviously any additional conductive material will do the circuitry no good at all.

Apparently Jeff had a Thorn 9000 in for service which included fitting a new tube. The job finished, the set was placed on the lowest storage rack to await collection. His dog inspected the various sets and finding that the 9000 carried a challenging smell he naturally cocked his leg and sprayed the touch tuner, then with a sniff trotted off without telling Jeff.

Some time later the set was put on the bench for a predelivery check. The full horror of what had happened burst on Jeff as soon as he saw the front of the tuner selectors. Needless to say they were totally inoperative. Thinking that it was just a matter of cleaning the sensors and drying out, Jeff merely kicked the dog and told him not to hiss over the sets anymore or he would be seen to. Alas a thorough cleaning of the touch tuner panel resulted in no improvement at all. The internal works had received a lethal dose of whatever it is that spells doom to touchy components and printed panels. No amount of cleaning and drying out restored reliable selection, and Jeff had no option but to replace all affected parts.

Particularly beware of ladies with two small dogs on leads. We know only too well that they attempt to outdo each other against any vertical surface in a strange place, and our shop is certainly a strange place. Fortunately there were no touch tuners around at the time. The fact that she had recently purchased a new unit audio and a colour set from us saved the dogs from our wrath. When I had occasion to call at their home recently I resisted the temptation to ...

### **Too Fast, too Slow**

A Ferguson studio something or the other music centre came in with the complaint that the records played too fast and the tapes too slow, with the weird result that records could be taped reasonably but the radio recordings were hopelessly wrong, records sounded like the Chipmunks and prerecorded cassettes of Maria Callas sounded like Paul Robeson.

Being used to funny things and people, we were not disturbed and immediately dealt with the record fault by clearing off the rubber deposit on the motor spindle. This restored its original diameter. The cassette section however was a different kettle of fish (why fish?).

We noticed that when fast forward or rewind was selected, it started at high speed and then slowed and

stopped. A meter showed that the motor voltage fell to zero, although the input to the motor control board remained constant. So we attacked the control board, in the wrong way of course as is our wont or natural bent you might say. Hang on a second. We are not naturally bent, I didn't mean that of course, I mean we usually do things wrong because logic is not one of our strong points. Our strong points are muddle, chaos and panic, in that order.

So we checked the three transistors cold and of course they read right. We then did it right and set the thing going. When it slowed we sprayed each transistor with freezer, and when one received a cooling draft the speed immediately increased. Replacing this restored normal operation.

In other words, a job which should have been done in ten minutes took an hour. Maria Callas now sounded like Maria Callas and on record Jim Reeves sounded like, well, Jim Reeves. I'm not keen on servicing these things: TVs seem so straightforward from a handling point of view.

### ***Bear with Us***

One of the nice things about running a personal business is that you deal directly with the customer and the customer deals directly with you (never mind about Laura Lovitt, we're not going into that . . . I mean, we need not discuss our flights of imagination just now). Although this is not always a good thing, in the main it is.

One unexpected facet is that we often receive small gifts as tokens of appreciation – bunches of flowers, pot plants, vegetables in season, the odd bottle of Bell's and lots of other nice things, quite often from people we thought we had upset or who had upset us, which all goes to prove that the milk of human kindness should be spread out even to those you can't stand the sight of at first. However, we received something recently which really shook us, and not only us, but the dog and cat as well.

To be honest I must say that this was from someone in the family, so perhaps it doesn't qualify as from a "customer". It was an enormous teddy bear, over 4ft. tall and 3ft wide (paw to paw), with a head perhaps too large for the body – the sort of thing most people like and most females love (why?). This could not be said for our cat and dog however. The cat took one look, arched her back with every hair extended, spat in defiance and then fled for dear life. Ben came in to see what all the fuss was about and was confronted with an enormous head a few inches away from him as he skidded to a halt. He looked away as if the bear wasn't there, which we took to be a gesture of submission, and slowly slunk away.

Thus our brave animals proved their worth when confronted by Ted, and instead of threatening them with the vet we've now only to say the magic word Ted to obtain instant obedience or at least their temporary absence. Which brings us back to our daily work.

### ***Caught Again***

We had a Thorn 3500 that lead us a merry dance the other day. The report was that it had suffered from the "twitters" for some time, the twittering being audible while visually the effect was of corrugated verticals. Someone had been in to fix it and had left it free from the twitters, but within a day or two the whole thing had gone off, the cut-out popping out as soon as the set was switched on. So we collected it and started.

There were no apparent shorts, so we started by unhooking the tripler. The set then came on and stopped on for a while, during which time we checked the 30V line and then

the 60V line which read more like 70V. Before we could do anything else, several things seemed to happen at once, with some smoke and the cut-out coming to the rescue as my reactions are so slow that they cannot be relied on to switch a set off quickly.

The 15Ω resistor in series with the chopper looked sick, while the chopper transistor itself was short-circuit. These items were replaced and the supply lines checked for shorts. The line output transistor was a dead short, and was also replaced. Just to be sure, we wound back the set e.h.t. control so that the 60V line would be under this. The set then functioned up to a point, but the line timebase was still taking too much current – measured by checking the voltage across the beam limiter sensing resistor R907 which was very hot though of the right value.

We eventually changed the e.h.t. transformer, which had shorted turns, only to find that the restoration of full timebase working resulted in severe arcing in the field timebase panel at C434 which is in the c.r.t. grid bias circuit. This resulted in the loss of three transistors and one diode. To cut a very long story short, this transpired to be due to our accidentally moving a capacitor in the line output section up against a tag on the e.h.t. transformer when the latter was replaced.

After this harrowing and self-inflicted experience, we set up the supply lines correctly, noting that the original twittering whistle had returned. We then considered connecting the original tripler, but decided to do this with caution. Rather than clipping the pulse lead on, we left the set on and advanced the clip to it. There was a vicious arc of flame when it got near. So out went the tripler.

With a new one fitted we had a fair picture, but it was marred by the corrugated effect whenever the brightness was turned down. We also noted that it got worse when the 60V line was reduced, and faded away when the 60V line was increased to an unacceptable level. This then was how it had been "cured" by the someone who advertised his services by only a phone number – by setting the 60V line too high. Apart from my bungling with the capacitor against the transformer tags, the "cure" had resulted in the loss of a lot of expensive bits and pieces.

So now we had to find the cause of the twitter and silence it. Something nagged in the back of my atrocious memory. This was a known fault. Surely not the core of a coil? No it wasn't. Check here, there and almost everywhere. Something started saying 0-01, 0-01 in the back of my mind. C631 in the chopper driver transistor's collector damping network was changed and the twitter stopped. Of course! We'd had the same trouble some years ago, but I'd forgotten it so easily. Why don't I jot these things down? Even if I did, I'd probably lose the thing I jotted them down on.

### ***And Yet Again***

It was inevitable that the next set would be a similar model (3000 chassis) with corrugated verticals that came and went. A fool to the last, we immediately whipped out the power pack and in a trice had fitted a new 0.01μF capacitor in the C631 position. With a leer of self-confidence, the power pack was replaced in another trice and the set switched on . . . the raster was still rippled of course. We shone a light on the decoder board and there was the core from L502 (h.t. supply choke in the line timebase) just lying there doing nothing – not even shorting anything out. A dab of adhesive and back it went and away went the ripple, hopefully never to return. Why didn't I do that first?

# Tapez-Les\*

## Les Lawry-Johns

FIRST we have to apologise for the error of location, or more exactly name, of the place mentioned in the unlikely tale related in the September issue. For those of you who spotted it (and several did) I merely claim a lapse of memory occasioned by old age, plus a little bit of a coincidence. For those of you who didn't spot the mistake, it doesn't really matter that Fayid is actually down in the canal zone. The rest of the story was true or nearly true. Well, not really, but it could have been . . . I think.

### *A Flight to the East*

I mean, look at the time we went well east of Suez, so far east in fact that we nearly went west, Fred flying the Tomahawk, Reg the Kittyhawk and me the Shitehawk. We didn't know where we were in fact, because we'd been troubled by wind of late. Fred thought we were somewhere in Burma, Reg reckoned we were in Rangoon, and I thought they were both right but we were still troubled by the wind which was ruining our war effort.

Fred said that he'd heard of a wall up north which would give us protection, and as soon as he'd said this a little man appeared with a little round hat which had a length of plaited rope hanging from the back of it. His hands were tucked up his sleeves.

“Ah . . .” he said. “My name is . . . ah . . . Sung Set Song.” There was something in the way he hesitated with the “ah” that made me feel even more uneasy, what with the wind and all. If he could help us however it would do no harm to listen.

“Centuries ago, ah, my people built great wall to keep out the wind. We came across it some time ago during our long march south, and as soon as we crossed it the wind troubled us no more.”

Fred did not doubt him as I did. "Tell us where it is, and Reg will write it down on rice paper."

Sung Set Song said “Go north young man. Fly fast over the flied lice fields until you cross the boulder where you will find many more boulders and this is the great wall that the north wind cannot pass. You will be safe there and the wind will wane”.

Reg wrote rapidly on the rice paper so that the precious directions would not be lost. Little did he know then that it wasn't rice paper he was writing on.

I'd heard rumours in Rangoon that a Japanese ex kamikaze pilot who couldn't be killed even by himself was posing as a charming Chinese, luring our lads and their Hawks to destruction.

This wasn't Sung Set Song. This was Muchashita the gentleman Jap. He was after my Shitehawk and that was why the paper was perforated. I didn't hesitate. I whipped out my weapon and shook it violently at him.

“You’re not Sung Set Song,” I screamed. “You are Muchashita the kamikaze killer and I claim the £5 prize for having unmasked you.” I hit him with my Hampton and he crumbled to the ground with a faint “Ha” as his cranium cracked under the mighty blow.

Fred hit him with his rhythm stick for good measure, while Reg was rummaging around for his rifle.

"Good God" said Fred. "How did you rumble the rascal?"

“Elementary. Had we flown fast to the wall we would have been whipped away by the wild wind. If you’d looked carefully at the paper Reg was writing on, you would have seen that the wall was full of holes. Please pay more attention in future and do not be fooled by funny fakirs.”

This was the end of our far eastern adventures, and if anyone wants to write in and correct the facts they are a better man than I am. Oh yes, we also sung a song on the way home.

In the street of a thousand "Ah so's."

By the sign of the swinging twit

Lived a slant eyed chinese maiden

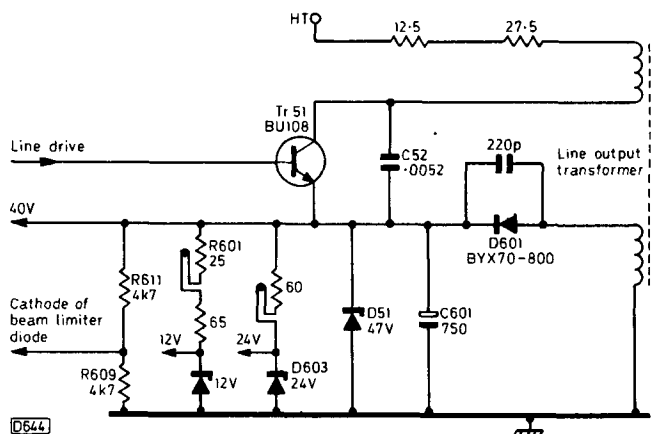
By the name of Hu Flung Slit.

## Enter Dennis

This should really be entitled "let the heartache begin", because until Dennis brought in that GEC 2121 I didn't know what heartache was. On a Saturday, just to make things worse. Well it looked innocent enough at first: a blown 3·15A mains supply fuse. Naturally we checked the filter capacitors and then headed straight for the thyristor rectifier. No joy. "We're not to blame" they shouted.

With some trepidation, we took the top screen off the line output stage. Both the small 4.7kΩ resistors R609/R611 (see Fig. 1) were blackened, and at the same time we noticed that the rear wirewound spring resistor was sprung – R601 to the 12V line. Now the fact that one or the other of these thermal cutouts is found sprung does not necessarily mean that there is a short in the circuit it supplies. More often it means that the associated zener diode has been asked to zener too much (you see).

This can happen in particular if the 40V supply rises much above the correct 40V. This supply is provided by D601/C601, and a small 47V zener diode (D51) is



*Fig. 1: Line output transistor circuit, GEC C2110 series. The transistor sits on a 40V line produced by D601/C601. 12 and 24V supplies are derived from the 40V line via droppers and zener diodes. D603 is often responsible for no sound or distorted sound.*

*\*Which is French for hit 'em, in case like me you didn't know  
– Editor.*

connected across the supply to prevent it rising above 47V – it's designed to short out, which is why it is not of a more manly type. When it's found shorted (as we found it) one tiptoes around a bit. Whilst the makers say that failure of D51 can be due to C601 becoming open-circuit, we're more inclined to look closely at the line output transistor since a collector to emitter short here will slap a sizeable chunk of h.t. straight on to the poor little zener. Sure enough, the BU108 was short-circuit.

A new one was fitted, after a struggle, at which point Dennis departed to do some shopping: he said he'd call back in an hour or so. The agony then started.

We thought we were being careful, unhitching the tripler and checking the lines before chancing mains application. All seemed well, so we connected a meter across the fuse holder and switched on. The meter swung across to over 3A, and instead of falling started to rise. We hurriedly removed the prod and carefully rechecked the h.t. line and the line output stage. The new little zener was short-circuit, but the new BU108 seemed o.k.

We next decided to chase the cause of the burnt 4.7kΩ resistors on the top of the transformer, though we were inclined to think that this was a legacy from some previous incident. The resistors read right, but we thought we'd change them and check the circuit with them out. There appeared to be a resistance reading where there shouldn't be one, and step by faltering step took us to the line output transformer winding – which had a leak to the core. "Oh dear" we said, "fancy that. Dennis will be pleased."

We had a replacement transformer in stock, and after a tussle it went in. I still don't like double-sided print, and will tell Arnold one of these days when and if I tie up alongside him. So the transformer was fitted and we decided that it would be better to fit a 3.15A supply fuse and stick a voltmeter on the emitter of the BU108 instead of a new zener. We crossed our fingers and eyes and switched on. The meter said 40V, and the sound came up normally. "Oh goody" we said. "Now we can hook up the tripler."

So we did that and fitted a little zener. This was a bad mistake. There was a hum and the zener burnt out. The tripler was faulty after all, the new BU108 was no longer new.

Dennis appeared with his shopping and his wife. "Not finished it yet?"

I looked sick. "I hope you've got plenty of money left after your shopping." He looked sick.

I told him the sorry tale. The tripler felt sick and this made the output transformer and the output transistor feel sick which made the zener and fuse fail and now I'd just lost another transistor and zener so I felt sick. While this was happening other sick sets were coming in, and I felt like volunteering to become a kamikaze pilot and end it all in one reckless dive. Actually I didn't, which is why I'm sitting here tapping away on this typewriter. We'll draw a veil over the rest of that day's happenings.

### Female Logic

Monday dawned dull and drizzly, and whatever good spirits we started with swiftly vanished.

"Our set is too big to bring in. Can you call? It's probably only a fuse." Since they also said it was a 26in. Philips colour set (G8) I was inclined to believe this, but it still seemed a long way to go (several miles) to replace a fuse – at my age. Anyway we set out with our box of fuses etc.

On the way we had to negotiate a roundabout. As there was nothing coming from the right I proceeded around it. A

car appeared from an entry on the left, straight across my path. I had to brake hard and so did the other vehicle – a car driven by a middle aged lady. She looked at me indignantly.

"I nearly hit you. Why can't you drive more carefully?" I thought this a little bit much, since she should have given way.

"It was your place to give way – to traffic coming from the right" I pointed out.

"Normally yes" she snapped. "But certainly not to an old vehicle like yours. Mine is much newer and you should have given way to me."

I'm always defeated by feminine logic, and this was about the most logical thing I'd ever heard.

"Very sorry ma'am" I said, touching my forehead as I didn't have a hat to raise. "It won't happen again. *I'll smash straight into you next time!*"

So on we went, bawling and shouting obscenities at all and sundry until we finally arrived at Lower Higham.

I rang the bell of number nineteen and waited ... and waited.

Finally a cheerful lady appeared from around the side of the house. "I'm round the back dear, so I didn't hear you round the front."

That's the second one I thought, but meekly followed her around the back and through the kitchen.

The set was in a room leading off the hall, and the hall was cluttered up with bits of central heating gear. This meant I'd be hard put to it to take the set away if I had to. The size of the set was another good reason.

Off came the back and we went straight behind the left side plug cover to the 3.15A fuse. It was intact, and our spirits sank a bit. With the mains switched on the tube heaters lit up and the voltage appeared at the fuses on the power board. This meant that in all probability the 800mA fuse on the right side line scan board was open-circuit. It was.

I removed the screening cover from the line output transformer and put the ammeter across the fuse holder. It read 2A and there was a spark inside the transformer winding. This was as expected and feared, since the one thing I hadn't brought along was a line output transformer. Fool.

I weighed up the alternatives and made the wrong decision. "You need a transformer. I'll have to go back to the shop to get one. Won't be long – I hope."

I was. All sorts of things needed sorting out, but I finally arrived back at Upper Lowham or somewhere, anyway at number nineteen. Round the back and through the kitchen. Hubby had arrived home by this time.

"Transformer eh? Thought it might be. Mind if I watch you fit it?" So we settled down to replace the transformer. Out with the panel and lay it on a newspaper to save the carpet from the droppings of my soldering gun. Make a note of the connections as my memory is feeble. I can still remember some things though. Like it's 1969.

It didn't take long to fit the new transformer, but it was one of those without the tripler nipple. The nipple is easy to remove from the original, so off it came and was swiftly plonked on with no trouble (I thought) and securely soldered into place. Refit the panel, check that all plugs are in position except the tripler (oh no, not again), stick in the 800mA fuse and switch on. The sound came on for a split second and then plonk, the fuse blew. Once again I felt sick.

The tripler wasn't connected so that was out. I'd also checked the line output transistors, the transducer etc.

Investigation showed that one of the line output transistors was short-circuit but not the other. Rummage in

box to find another BU205, thinking why, why, why? Out came the faulty transistor and in went the new one. Check around with the ohmmeter, and get some funny readings as the emitter of the other transistor was correctly connected to chassis but so was its collector, which suggested that it was short-circuit. I'd only just checked it when the heatsinks were off however and it read right then. A shorted tuning capacitor? No.

Just as I was about to die, I looked at the top line drive panel and there on the top right was a thin sliver of solder from the chassis screw to the 1Ω base resistor. I felt a bit awkward.

"Some clumsy bugger has let some solder fall on the panel where it shouldn't be."

"Yes, I saw it drop when you were soldering on that nipple. I thought you saw it too and it didn't matter." Funny how some people are good at things and others never quite get the hang of it.

With the short cleared, the tripler could be connected and a picture displayed. A pretty grim picture it was too.

"We've never had good colour on this set. The other people said there was nothing that could be done."

I couldn't quite understand this, since the tube seemed quite good. Resetting the drive controls and the first anode presets restored a very reasonable grey scale, and a touch

on the convergence made an immense improvement. When the colour was turned up, faces looked like faces and not like burnt toast.

So the job was wrapped up, and we regained a little of our shattered confidence – until we looked at the picture again and found that the red had dropped out. Out tools, off back (again), and check the colour drives. Horrible dry-joint on the red amplifier base. Resolder and recheck. Wrap up (again) and get out quick.

### Back at the Ranch

"You've been a long time. I don't know: it seems to take you longer and longer to do these outside jobs lately. Are they all that hard to sort out?"

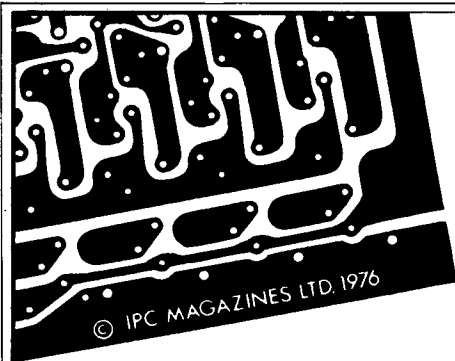
"I don't know either. I never seem to do anything right first time."

"Perhaps it's your age. Can't you take some of that stuff that fortifies the over fifties?"

"I do. Sometimes I take whisky, sometimes brandy. Both fortify me. What does fortify mean anyway?"

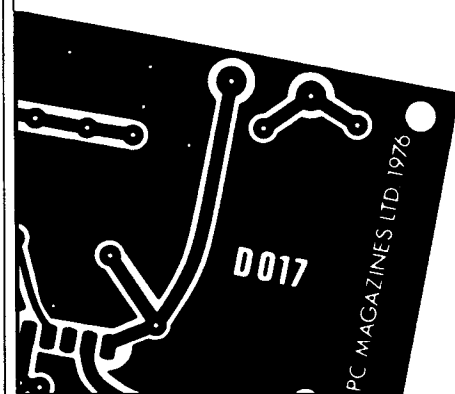
"How do I know? You'd better get on with mum's set though. If she doesn't have her telly tonight she'll go barmy."

Oh! I do love my mother in law . . .



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# There's a Moose Loose

*Les Lawry-Johns*

HOW I got the name confused I don't know. She phoned to say that her Bush had lost its sound and picture. She also seemed to know us well, which was a mystery to me as I couldn't recall her or the set. She said her name was Loose, which I took to be the surname, and when I sounded vague she gave the other name, which was Pretty. So I wrote down Pretty Loose.

In fact it turned out to be Lucy Pretty, but I couldn't be expected to know that at the time. When I got there it all became clear, because I'd known Lucy from way back. But she'd married again, and now had the name Pretty and a TV which we didn't know.

The set turned out to be a Bush model fitted with the Z179 chassis. This is one I've yet to get on really familiar terms with. There was a raster on the screen, but precious little else. With the rear cover off we pondered upon the possibilities. With the voltage supplies intact but no sound or vision signals, it seemed likely that the fault would be in the i.f. strip. This is a plug-in panel on the left side main frame, which can be withdrawn when the bottom runner is pulled round.

The TBA750 intercarrier sound i.c. is at the top, and using a finger as a test probe we found plenty of life at the input to this, with some fellow talking to me in a language I didn't understand. This i.c. is fed from the SC9503P video detector i.c., and the fellow chatted away when we touched its output but had nothing to say at the input. So it seemed likely that this i.c. could be the culprit. Did we have one? No, but we did have an MC1330P which does the same job. Take out the i.f. unit, whip off the little chip with a wave of the desoldering braid, and plonk in the MC1330P with eight deft dobs. Slide the i.f. unit back in and check. Now it talks in my own language and there's a picture.

Now there's a bit of luck we thought, viewing the rest of the chassis with some trepidation.

"Done it already?" cooed Mrs. Pretty. "It must be a much easier set than the one we had years ago that you took so long to get right. You must remember. The Philips with the big flat screen."

I remembered. Well. As a matter of fact, I still have the projection unit, slightly rusted, to remind me.

Mind you, Lucy was a cracker in those days. Still quite nice, albeit a little weather beaten you might say. Who isn't?

With a short exchange of pleasantries I prepared to leave, but at the moment of departure Mrs. Pretty remembered that her neighbour had asked her if her man would pop in to have a look at their set?

"Would you pop next door to look at Mrs. Moose before you go? Their set is playing about."

## ***A Visit to Mrs. Moose***

So that is how I came to be ringing the bell next door. A pleasant woman opened the door, and I heard a voice call from inside the house "who is it?"

"It's the telly man dear."

"The tally man? Oh my Gawd." There was a sound of someone beating a rapid retreat.

"Not the tally man, the television man, stupid. Come

back." I never did find out why Mr. Moose didn't want to meet the tally man.

The set was a Thorn 3000 which couldn't be tuned. The push bar and spring from the tuner were at the bottom of the cabinet. It didn't take long to reassemble it and solder up.

The programme could then be tuned in, but apart from a few faint bars the colour was absent. This responded to a tweak of L302 (reference oscillator output coil) and the colour appeared to be fine through a mirror – until the snooker table came on that is.

It was red. I thought snooker tables were all green, except when they are blue. Then I noticed the player's face. He didn't look at all well. Someone's changed over the tube leads I mused quietly to myself. They hadn't, and for the life of me I couldn't think of a reason for this reversal. As I crouched behind the set, crying my heart out so that the bitter tears hissed on to the hot dropper at the rear of the power board, I heard Mrs. Moose mumbling something about lovely colour.

I looked up and the table was green, with faces a nice bright orange. It transpired that the normal sequence of events was that the picture would come on with no colour, then some bars would appear for about five minutes, then the colour would come on with reversed reds and greens, and then all would be well. What I'd done was to tune in the reference oscillator so that the colour would be there from switch on, but the reversal remained, for a few minutes only, after which normal service would resume.

"We only wanted you to get the tuning right. The colour doesn't worry us. We thought it was supposed to be like that until it warmed up. I hope the bill is not going to be too much, only my husband is a little short this week so we can afford only bare essentials."

Which is why I didn't find out what really was happening, and I still don't know. I've seen plenty of out-of-phase conditions which usually respond to adjustment, but not a complete reversal that rectifies itself so suddenly (which shows just how ignorant I am).

Returning to the pad, footsore and weary, I was greeted with the usual smarty pants remark.

"Where have you been? Playing fast and loose no doubt."

"Fast and moose you mean," and I related the sorry tale to the disbelief of her highness who flounced off upstairs and shortly began to sing her bitter song of hatred and resentment.

"I'm a little prairie flower

Growing wilder by the hour.

No one cares to cultivate me,

So I'm as wild as wild can be."

I could tell she was a bit mad by the way she banged things about. I don't know why, but then I never could understand the wonderful workings of a woman's mind. It's a good job we are so logical and placid, so understanding and reasonable. No one can accuse us of doing unreasonable things, even when we are faced with insurmountable obstacles and impossible tasks (as we are every day, as you know only too well). I sometimes feel we



Trouble rarely comes singly. If you get one horror there's bound to be another close behind.

I was just finishing off a Pye 697 which had had just about everything wrong with it, including an open-circuit reservoir electrolytic, an open-circuit 10M $\Omega$  resistor in the width circuit, an open-circuit 12k $\Omega$  red output pentode load resistor, open-circuit print to the blue ditto, open-circuit line sync discriminator diodes due to the 47k $\Omega$  reference pulse feed/integrating resistor going low before disintegrating, plus a few less trying teasers, when a couple popped in to ask if they could bring in their 22in. Bush colour set which had popped off. I said they could, so off they went to get it.

"Wouldn't be so bad if he knew his job, would it?"

So off went the owner of the Pye, back to the back woods  
from whence he came. And in came the Bush.

"Our son had someone in to look at it while we were away, but as the chappie said it was going to cost quite a bit to repair he left it until we came back. So we thought we'd see what you had to say about it."

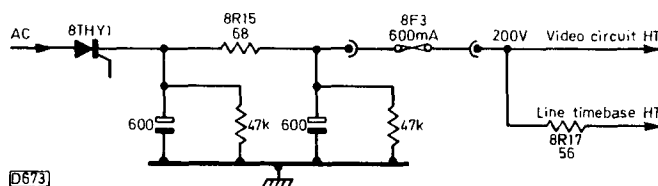
Fortunately is wasn't one of those Z179 ones, but one of the more familiar A823 type. The h.t. line fuse at the top of the power panel was a nasty black colour, denoting that it had died a violent death, probably due to something over on the line output side. We checked the resistance to chassis. The needle flicked over and climbed back towards infinity.

What devil's work was this? Infinity meant no circuit through the smoothing resistors etc. Both the  $68\Omega$  and  $56\Omega$  wire-wounds in the h.t. circuit were open-circuit (see Fig. 1). Killed no doubt by someone bunging in a heavy fuse or some other blunt instrument. Check at the other end of the  $56\Omega$  resistor. Still no reading, except for a faint suspicion of a movement. Look over to the scan panel. All three plugs out.

Put them back in and now record the low resistance reading expected. So we pronounced our verdict.

"This is a clear cut case of the Howling Heebie Jeebies. It's never an easy thing to cure, and it'll have to stay overnight."

Left alone it didn't take us long to establish that the line output transistors were short-circuit. So some patience and a fair bit of time were going to be needed, as replacing these in this set is not our favourite occupation.



*Fig. 1: H.T. feed circuit, Rank A823 chassis. The h.t. fuse 8F3 and the two resistors 8R15 (smoothing) and 8R17 (anti-breathing) were all open-circuit.*

"Hallo" said Mr. Sparks. "It wouldn't go inside. Could you give me a hand to lift it off?"

The spindly luggage rack groaned as we unstrapped the set, and I'm sure the little car rose a foot when we lifted the big Bush free.

"One thing's for sure Mr. Sparks. It won't go back home like that. I'll deliver it for you."

"Don't worry" said the indomitable Mr. Sparks. "I had one arm out of the window supporting it when we went round corners."

Back at the bench we wrestled with the first one. In went the transistors, back went the tripler (leaving the input out, just in case this was the original cause of the trouble) and the unit was reassembled. Both the wire-wound resistors were replaced and all seemed ready. We wound down the "set H.T." control and connected a meter switched to the 1A range in place of the h.t. fuse.

On switching the set on, the meter hardly moved. This was not encouraging, so we put a 630mA fuse in and checked the h.t. voltage. It was under 200V, and this was also present at the line output unit.

We next checked the line driver transistor and found it had no 20V supply. Back to the power unit, where the 6-8 $\Omega$  resistor (8R2) was found to be open-circuit. In went another resistor and the timebase now started working.

We next had to check the tripler, so out came the h.t. fuse and the meter was again connected in its place. It read under 400mA, so the tripler was reconnected and the e.h.t. rustled up nicely and the meter showed only a small increase. Back went the fuse and all was well.

There were a few questions for which there seemed no answers. If the 6.8Ω resistor supplying the 20V line went first, the line timebase would have been inoperative, drawing no current. Could the line output transistors short under these conditions – h.t. high maybe? How come the two h.t. wire-wound resistors were both open-circuit if the correct fuse was fitted? Why were the plugs left out on the scan panel? Could it be that the two black ones had been interchanged by the first intrepid explorer? The answers to these and many other questions will not be revealed in the next instalment.

Up on the bench Mr. Sparks' Bush was coaxed into giving up it's secrets. You'll never guess, but the 600mA h.t. was blown. Oh no, not again. Please not again.

I raised the convergence panel to check the condition of the front smoothing resistors, and was immediately confronted with a nice big hole where 7RV3 (7 $\Omega$  R/G horizontal tilt control) had been. The remains of 7RV3 were found laying at the bottom of the cabinet.

Did it die or was it killed? Hope it died, but proceed as though it has been killed. Fit a new control of a more robust type. Check for shorts at the fuse holder and at the h.t. resistors, which both seemed intact. Connect the meter across the fuse holder and switch on. Two amps. Switch off quick.

Disconnect the input to the tripler. Switch on. Now 400mA. Fit another tripler and 630mA fuse. Check h.t. and reduce to 200V. Tidy up convergence and prepare report for Mr. Sparks.

# Oh Dear What Can the Matter Be?

Les Lawry-Johns

ONCE upon a time there was a chap who was quite good at his job. When sets came in for repair he would have bets with himself that he could not only diagnose the cause of the trouble from the customer's description of the symptoms, he could also rectify the fault before the set was switched on for test. No longer. Now he has a furtive air about him, and is evasive and wary, hedging his bets with "ifs" and "buts". Now and again some of his old confidence returns, after a day of bull's-eyes or near misses, but it doesn't last long and the next day brings the usual catalogue of minor disasters, wrong conclusions and general cock ups.

## Widely Varying Colours

For example. A Pye CT222. The 725 chassis – solid-state with vertical panels. Customer's complaint: widely varying colours. Sometimes red, sometimes green, sometimes blue, with combinations of each. Diagnosis: a faulty thick-film unit (R428 etc). Voltage tests revealed wide variations at the collectors and bases of the three RGB output transistors.

We turned to the pile of thick-film units, only to find that they all had five legs (Thorn 3500 type). We then remembered that all recent invoices have said that the Pye units are out of stock. The fool is nothing if not stubborn, and decided to make up the unit himself with wire wounds and carbon resistors – patiently and with infinite care. In they went, one after the other, until the circuit was complete. But the colour variations continued.

It was mainly red now and checks directed suspicion to the TBA530Q matrixing i.c. In went another. Now mainly green. In went another. Perfect colour. The first two i.c.s went into the bin. Tap the panel to make sure. Colour mainly blue, then a combination of variations. Retrieved i.c.s from bin. Carefully tapping around brought us to the TBA990. Remove it from its holder and refit it. Trouble cleared and no amount of tapping would bring back the variations. Why didn't we do this in the first place?

## Loud Arcing and Spitting Noises

Next a GEC C2111. Customer's complaint: loud arcing and spitting noises. Diagnosis: excessive e.h.t. due to high h.t. Probably a faulty thyristor. In fact the h.t. was high at the top right side droppers – 230V instead of 190V. Change

SCR701 (see Fig. 1). No difference. Check setting of P701. Little variation. Cannot leave set on with high h.t. as there's a risk to the tripler, line output transformer, transistor etc. (remembering recent expensive losses).

Check components cold. All read right, including all resistors. Change diac D701, BC147 and 7.5V zener (just in case). Fit 33Ω dropper section in place of fuse FS1. H.T. now below 180V, as expected, but P701 still not producing the variation it should. Experiment with values of resistors in series with P701. Find single 820Ω resistor works better.

Remove 33Ω resistor and fit fuse. H.T. can now be set correctly, and there's no discharge. Check grey scale and suddenly e.h.t. starts to spit viciously. Excessive width and h.t. up to 240V. Back to square one, and P701 now has minimal effect.

Squirt P701 with freezer. No effect. Squirt R706. No effect. Squirt R709 and h.t. drops to correct figure. R709 (270kΩ) going high when mains applied, had read correctly when checked cold. Replace with 1W type to be sure. Panic over and now remember that we had had similar trouble, with an open-circuit R709, a couple of years previously. Had forgotten of course.

## No Results with Plasticity Smell

Next a Bush T20A. This is the current Bush chassis, with the centre field timebase etc. swing-down panel. Set only just out of guarantee, but not one we'd sold. Customer's complaint: no results with plasticity smell. Diagnosis: faulty tripler. The warm line output transformer overwinding seemed to confirm this. Fit new tripler. No change. Fit new line output transformer and all is well. Faulty line output transformers not uncommon on this chassis. Ponder. The earlier A823 series used a lovely transformer, never any trouble. The monochrome TV161, TV181 etc. series transformer, murder.

Shopping list for line output transformers. Monochrome: Bush-Murphy all models TV161 on; Philips 210, 300 series; Indesit T24. Colour: Philips G8; Thorn 3000/3500 e.h.t. transformer T503 (usually killed by tripler); now add Bush T20.

## Varying Focus

Next a Bush Z718 chassis. Continue in our bumbling

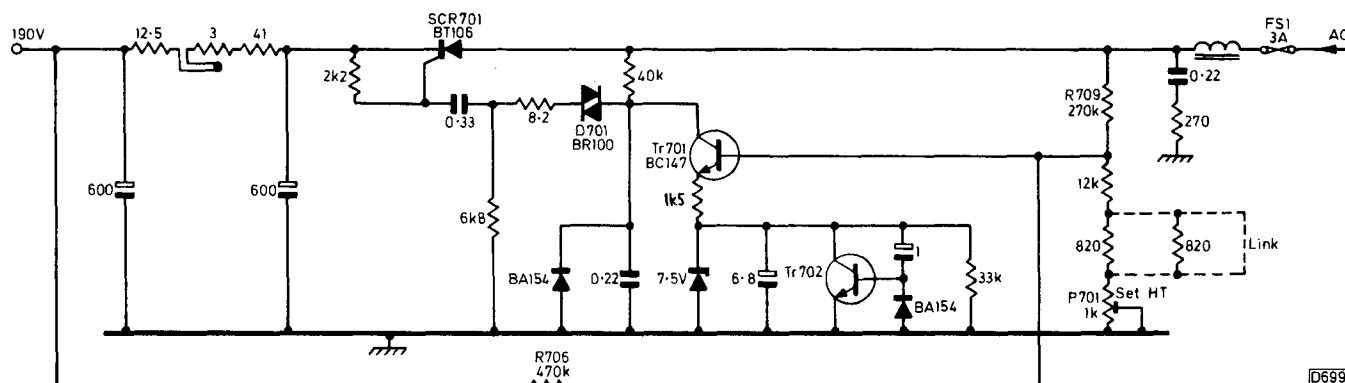


Fig. 1: H.T. supply circuit, GEC C2110 series. Early versions differ in several ways.

way. Customer's complaint: very poor focus for the first half hour, gradually improving; no variation in picture size. Diagnosis: faulty thick-film focus unit.

Now it should be pointed out that there's no tripler in this chassis. Instead, a large overwinding feeds a single stick rectifier (see Fig. 2). The full e.h.t. is applied to the focus unit, which reduces it to the 4-5kV required at pin 9 of the tube. There are two 100kΩ resistors in the circuit, but both seemed to be in order. A meter check confirmed that the voltage at pin 9 of the c.r.t. was low, while fully advancing the focus knob produced little improvement. So a new focus unit was fitted. No improvement.

We wept bitter tears until we recalled our friend Ray moaning and groaning about the type of tube base socket used in these sets. "Makes you think the bloody tube has clapped out" he'd said, "until you take the tube base off and find the tube's pins pitted and corroded." So we removed the base socket and found pin 9 pitted. The quick meter check had not taken into consideration the very high resistance of the thick-film unit, and the 3kV in fact was some 5kV.

Carefully cleaning the pin and fitting a new tube base socket restored normal focus, and we resolved to write it down so that others would not be similarly fooled.

### A Thorn 1590 with No Results

A Thorn 1590. Now any fool can diagnose the faults that occur on these well known portables. Only an idiot could get mixed up. We did.

"It doesn't come on" said the customer.

"Blown l.t. fuse" we correctly diagnosed, in a blinding glimpse of the obvious.

Cold checks on the line output transistor and the associated diodes and electrolytics revealed nothing amiss, and we didn't even notice the spidery black lines across the top of the line output transformer. A meter in place of the fuse read 3A when the set was switched on, with pretty blue arcing across the top of said transformer. Now we didn't immediately condemn the transformer to the rubbish bin: it occurred to us that the set was probably used in the kitchen, and that the top insulating material had probably suffered as a result. The conductive paths were scraped away therefore, and the fresh surface treated to a dose of silicone. A 2.5A fuse was fitted, and the set switched on. Pop went the fuse, after only a very brief period. The meter was brought back and showed 3A as before, but there was no sign of life around the line output transformer.

"It must be bugged after all" we thought. It wasn't of course, but we touched it to see if it was warm and were struck by the warmth coming from the e.h.t. stick. "Well I never" we said. "Either the stick is faulty or the 1kpF disc e.h.t. reservoir capacitor is short-circuit (C115, 1590 chassis only). So we disconnected the capacitor and found it short-circuit. "Oh well" we said, "if it's left out of the 1591 it can be left out of this one too."

In went another fuse, and we switched on. Pop went the fuse, just as before. "Goodness gracious me" we murmured, "the stick is still sick." So we changed this and the 1590 lived happily ever after, because before we wrapped it up we checked the supply line and found it a little high, resetting the regulator to reduce the supply to 11.5V.

### VHFOK, No AM

A Fidelity radio, type 23. Just for a change we thought we'd tackle a radio. "V.H.F. o.k., no a.m." said the customer. The diagnosis was swift and wrong: faulty a.m.

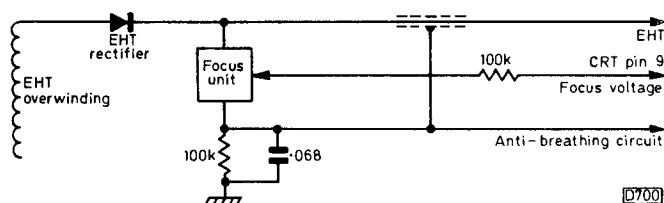


Fig. 2: Focus circuit, Rank T20 chassis.

mixer-oscillator transistor (BF194).

The back was off in a trice, but the panel took a little longer because when we took out all the screws the tuning dial fell off. Eventually the panel was in one piece and out.

Sure enough, touching the base of the BF194 restored medium and long wave reception, so the suspect was removed and a new one fitted – without melting the dial cord (our usual forte). The a.m. reception was now good, so the panel was manfully refitted and secured, together with the rear cover. Recheck to be sure. No a.m. Remove rear cover and explore area of the BF194. The 4.7kpF capacitor at the top of the panel was tapped and the signals returned. As we fitted a new capacitor the cat watched intently, probably wondering why we seem to have to do everything twice.

### The Day the VAT man Came

On the morning the VAT man came to check the books and figures the daily comedy was already in progress. We were on the phone trying to find out if there should be some form of tube guarantee form with the new Pye/Philips colour portables (KT3 series) with the 14in. tube. As the 16in. version comes complete with said form or card, it seemed reasonable that there should also be one with the 14in. version – at least it did to our befuddled mind.

We were put through to one department after another of the mighty Philips organisation.

Service: "We don't know. Try new sales."

New sales: "We don't know. Do you want a card sent to you?"

"No, I only want to know if there should be one or not."

"We don't know. Hang on, we'll put you through to P.R." (I think that's what he said).

On it went, from pillar to post, all for the want of a yes or no. Finally it must have been the managing director who said "we'll ring you back." But he never did. We now know that there's no separate guarantee card with the 14in. version, simply because none have had one.

The Vatman sat with the books and found all the mistakes we've made over the past couple of years, whilst we attended to the customers.

Small boy. "Can you mend my torch?"

Tall man with pointed teeth. "I put the battery you sold me in my clock but it doesn't work, so I've brought the clock in for you to look at."

Local vet. "The auto-pilot on my boat keeps sending me round in circles. I think it's this 12 to 24V power unit. Can you check it at 100mA?"

Local vicar. "This slide projector isn't working properly. Just have a quick look will you?"

And so the morning passed. "Can you come and look at the telly, all the buttons get ITV." The frustration built up and the Vatman looked on pityingly. "No wonder you make mistakes in the books. If I'd to contend with that lot I'd be barmy too. When are you going to put some money in the till?"

Smarting under this, we decided to vent our spite on a

dear little old lady who crept quietly in and stood hesitantly, looking from me to the Vatman.

"Television" she said in a very small voice. Thinking she'd come to ask daft questions about her no doubt clapped out old set, we started an imitation John Cleese/Basil Fawlty tirade.

"Television, television. Of course television. No doubt you want to buy a nice new one. How about a splendid new 22in. colour set with all the trimmings?"

"Yes please" she murmured. "How did you know what I wanted?"

The Vatman collapsed with laughter, while we were made to look dafter than ever.

### **Solly, Velly Solly**

Finally an apology. Apparently one or two readers wrote to say they found our far eastern adventures (December issue) vulgar and offensive (and probably dull too). We're sorry, and to prove it we cut out the succeeding account of our adventures in the frozen north, where we travelled to meet Solo Joe and Eskimo Nell. We try to have our bit of fun, but apparently it doesn't always come off.

# Computerised TV

## **Part 1**

MICROPROCESSOR and microcomputer i.c.s seem to be cropping up everywhere nowadays. It's hardly surprising therefore that TV manufacturers have found uses for them. First, what's the difference? Well, they both enable a great deal of digital signal processing to be carried out in a single chip. The differences relate to the internal memory arrangements. Clearly the chips require memories so that they can remember what they're supposed to do and how to do it, and to store data as necessary during the processing operations. A microprocessor's memory is of the ROM (read-only memory) type, i.e. it provides outputs as required but you can't feed data in and get it back later. Typical examples of ROMs are the character and graphics generator i.c.s used in VDUs and teletext decoders. A microcomputer is more flexible because it also incorporates a RAM (random-access memory) which will hold and release data as instructed. The data store in a VDU and the page memory device in a teletext decoder are of the RAM variety.

The use of digital techniques in domestic TV sets started a few years back – with a rather expensive, up-market Barco colour receiver. This had an automatic tuning system – similar to the arrangement used in the Grundig SVR videocassette recorder, described in these pages last July. Digital tuning and remote control systems are becoming increasingly common in TV sets, and are also found in the latest VCRs. Once you start using digital control systems, it's logical to employ a microcomputer i.c. to control the system. Both Philips and ITT have published details of microcomputer TV receiver control systems recently, and we shall doubtless find these in the more complex TV sets featuring teletext and viewdata facilities before long.

One of the first items of domestic TV equipment I've had an opportunity to examine using a microcomputer chip is the Sanyo VTC9300P, a Beta format VCR. This uses a microcomputer to act as an off-air timer and tape counter. In other VCRs these functions are carried out by a mixture of special-purpose i.c.s, standard TTL i.c.s and electromechanical devices.

It's worth taking a look at the techniques used in the VTC9300P, since the microcomputer system Sanyo use is fairly simple yet has all the features found in more complex systems. In fact it provides a good introduction to the microcomputer.

The microcomputer chip itself is the Texas TMS1070, a variant of the TMS1000. Before delving into it however, let's briefly outline what a microcomputer is and can do. It's a simple computer of course, and has been described as a

very large-scale integrated circuit (VLSIC) which, by performing a sequence of programmable (in manufacture) operations, can fulfil a wide range of different electronic functions. The advantages of using a microcomputer are its low cost (less than £5), the low component count achieved, and the ease with which the instructions (and thus the functions the device will perform) can be changed by the i.c. manufacturer to cater for different applications.

### **The TMS1070**

Like the other microcomputers in the TMS1000 series, the TMS1070 is basically intended for calculator applications, use in cash registers, and to control microwave ovens and simple industrial processes. The TMS1070 contains all the essential elements of a microcomputer in a single 28-pin package. Fig. 1 shows the basic elements of a microcomputer. The data enters via the input/output interface, is modified or acted upon in the central processing unit in accordance with the programme held in the memory (ROM), and is then fed out. The microprocessor is basically the same, with the omission of the store (RAM) which increases the flexibility of the processing system. The TMS1070 is a p-channel MOS device and is equivalent to some 125–150 TTL i.c.s.

A block diagram of the TMS1070 is shown in Fig. 2. The following is a simplified account of what goes on in it.

### **Programme Memory**

The ROM holds the basic programme material, i.e. the operating instructions. It's constructed in accordance with the basic specification for the device, using a single-level masking technique. Once programmed therefore the TMS1070 cannot be altered. In other microprocessor/microcomputer systems an external instruction ROM can be used to increase system flexibility.

The ROM in the TMS1070 can contain up to one thousand and twenty four instructions, arranged in eighteen pages, i.e. sixty four instructions per page. The microcomputer can take any one of these instructions from the ROM and carry it out in twice ten to the minus six seconds – pretty fast!

Each instruction consists of eight bits (binary digits). So the ROM contains eight thousand one hundred and ninety two bits. Why these rather odd numbers especially as, in Fig. 2, the ROM is labelled one k but contains one thousand and twenty four instructions? The answer is that since this

# I'll See You Again

Les Lawry-Johns

I was singing away to myself and to (the annoyance of) the cat and dog when a rather familiar car drew up outside. It was the car of the scatterbrained blonde from one of the shops in the town (I can't be more explicit for fear of libel). She came crashing in through the door.

"Oh dear, you'll never guess. It's gone again, right in the middle of the film last night. Isn't it terrible? Just about everything that can go wrong has done. Now this. I was only saying to my daughter last night, the sooner your father comes home the better. He's only been away three months, and literally everything's gone wrong. If it isn't the car it's the central heating, and if it isn't that it's something else. Now the telly. My dear you'd never believe it. Men have no right to leave us for more than a few hours. It's all left to me. My daughter put her coat on and went out as soon as I started to tell her about the freezer going soft because the vacuum cleaner had knocked the switch up the day before."

I reeled before the onslaught as she paused to draw breath, and was relieved to see my wife appear on the scene to find out what all the fuss was about. She had to listen while I escaped to get the set out of the car.

Mrs. Brashley got her second wind, and continued her tale of woe. Apparently she'd knocked the wing of her car, and whilst it was being repaired she'd got her husband's car out in order to keep it in good running order and just as she was in a stream of cars approaching some traffic lights she happened to glance down at the birthday card her husband had sent her and consequently she didn't notice the cars in front slowing down as the lights changed and this was how her husband's car had a nasty dent in the front. It was all pure bad luck and there seemed no end to it.

## *It'd Gone Pop*

By this time I had the set up on the bench and the rear cover off. It was a 26in. Pye of the 741 ilk (725-731, with vertical panels and all that). By the time Mrs. Brashley had related the sad tale about the water dripping through the bedroom ceiling, I had the filter capacitor replaced, a new fuse fitted, the set tested and had put it back in the car. She hadn't noticed any of this and finally remembered why she's come.

"Would you be kind enough to get the set out of the car for me? I'll call for it later."

"It was your set I was doing while you were chatting dear. I put it back in the car so you won't have to call back later." I was wrong, so wrong.

## *An Elusive Hum*

Although this next one concerns a unit audio, it could well concern a TV set – and not only from an audio hum point of view. It was a Ferguson unit, using the 78S chassis. The complaint was severe hum on one channel only. This was confirmed on test, and the hum remained severe at minimum volume setting.

Since the other channel was not affected, the power supply and smoothing were assumed to be in order. Some time was spent identifying the relevant components etc. in

the defective channel, and it was found that the hum was getting in at the base of the preamplifier transistor immediately following the volume control. This was rather disconcerting, since the control was at minimum and the only components between it and the transistor's base are an  $0.1\mu\text{F}$  capacitor in series with a  $1\text{k}\Omega$  resistor. The base is biased by a couple of resistors between the negative supply and the positive return, the supply lines being common to the other channel.

A test electrolytic from the transistor's base to the positive line removed the hum, thus proving that it was not entering the circuit later. The transistor was removed and proved faultless. The resistors were unhooked from the base contact and proved correct, as were the small correction capacitors in the circuit. When these items were refitted and the unit was switched on again the hum could hardly be heard. This seemed strange, since nothing had been found at fault.

Not wishing to quarrel with our luck, the unit was reassembled and when the last screw had been refitted it was tried again. The hum was there, buzzing away like an angry bee on one side while the other side maintained a discreet silence until the volume was advanced when it related how it spent a lovely day at Bangor.

Out came the screws, out came the unit, and we started all over again. Voltages tested, capacitors checked, even when they couldn't be at fault. At last we removed all the components from the base circuit of the suspect preamplifier transistor. It was only then that we saw it. The end of one resistor (the  $1\text{k}\Omega$  one from the base to the  $0.1\mu\text{F}$  capacitor) had a greenish tinge, with more green on the lead out. It was close up on the panel to the main smoother, and a bright light directed on to the component side of the panel showed a damp area. It was only when the electrolytic smoothing capacitor was removed that we were able to see where it had been leaking.

A clean up and a new capacitor restored hum-free operation, but we were not quite able to see why the hum had been so severe, with the voltages apparently not affected. But then there are many things we don't understand. For example...

## *This Time it went Bang*

Mrs. Brashley phoned later to say that the set had functioned beautifully for a couple of hours and then gone bang (not pop). Back it came, and when we looked at the print side of the power board there was a blackened area on the lower right side where one tag of the input choke had been dry-jointed and had been sparking. The glass of the 3.15A mains fuse was missing, leaving only the end caps, so as she said it must have been a pretty hefty bang.

With the connections properly made and the panel cleaned up, it remained to find out what else had suffered. The items next to the explosion area provide over-voltage protection (see Fig. 1): the BC147 transistor VT881 was shorted, also the 7.5V emitter zener (D884). These were replaced and the set tried, but the h.t. wouldn't come to life. Checking the circuit showed that the collector of VT881 is connected directly to the trigger diac D892 and diode

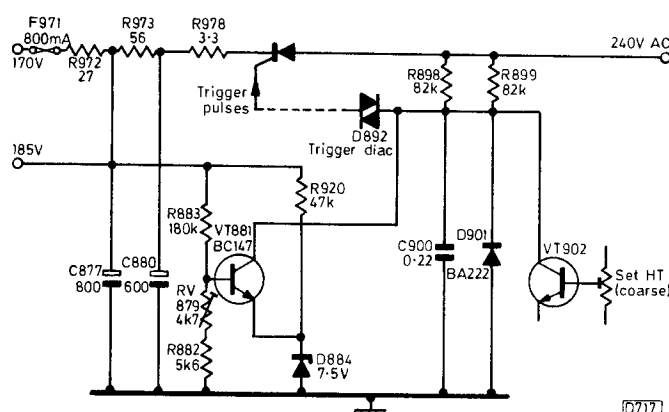
The picture was now horribly grainy however, and although the tuner could have been at fault we were more inclined to suspect the i.f. filter and gain module. We normally plod through these with a soldering iron, but one's always left with the feeling that the repair may be only temporary. As it happened we had one of the replacement units especially designed by LEDCo and supplied at a very reasonable price. It looked good and when fitted performed very well indeed, so we had the comfortable feeling that at least the set wouldn't come back to us on this score.

### ***Back to Back or Front***

Well, in we went to see the non-working set. Actually they have two Dynatrons, both 26in., one with a videocassette recorder built into the top. This was the one that wasn't functioning.

I wonder what's at the centre h.t. fuse F971 (see Fig. 1)? Nothing. I wonder what's on the 3.3Ω wirewound which sits on top of the centre housing (R978). About 35V at each end! Ridiculous, I thought. You just can't have such a silly figure. But it was there. I switched to a.c. and checked on the body of the thyristor. 240V.

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When the dropper had been replaced we tried again. Now there was no voltage at all, so the 35V had merely been the charge left on the reservoir capacitor when R973 had gone open-circuit the previous day. But why no h.t. now? Clearly the thyristor wasn't firing, since it had the full a.c. on its anode.

By this time the panel was flat down and every suspect had been checked. My knees and legs were aching, and I just had to get up and stretch. My bleary eyes then caught sight of a rectangular box lying free on top of the set between the photographs. The sickening realisation dawned. I slapped the panel back in, plugged in again and rocked the standby switch on the remote control unit. The set burst into life as the thyristor was triggered, and I made a mental note to look up the remote control circuitry when I got back to the ranch.

### *Jacko and the Wee Lass*

No sooner had I got back than the phone rang and I was scared stiff in case it was Mrs. Brashley. It wasn't. It was

# next month in

# TELEVISION

## ● WIDEBAND RF PREAMPLIFIER

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## ● TELETEXT THE PHILIPS WAY

The Mullard/Philips range of teletext decoder i.c.s is used in the current Pye and Philips ranges of teletext receivers. Harold Peters describes how the Philips type teletext decoder is arranged and works, and the way in which it's incorporated in the Pye/Philips teletext models. Servicing notes will be included.

## ● THE VIDEO DISC SCENE

Several video disc systems have been announced and are due to arrive on the domestic market in the next year or so. There's likely to be a major battle to decide which system gets accepted as the standard for the home user. David Matthewson outlines the present situation.

## ● SERVICING FEATURES

Steve Beeching with some more VCR troubles, more on the Zanussi BR1026, and all the usual servicing features.

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Mr. Jackson who had bought a 22in. Pye hybrid set from us some years ago.

"Can I bring the set up Lawry?" he enquired.

"Certainly Mr. Jackson. At your convenience, so long as it's at mine as well."

"O.K. Lawry" said the bonny Scots laddie. "See you soon. And by the way, give that wife of yours a kiss and cuddle for me will ye?"

"Do your own dirty work" I retorted, mortally offended. I put the phone down and turned to Delilah.

"It makes me sick the way you flirt with all the customers" I complained. "And under my very eyes too. No one seems to be afraid of me any more. You just wait till Jacko comes in."

Well Jacko came. Brought the set in. Put it down and by chance my honey bunny happened to be passing through at that moment and received the kiss and hug he had threatened. It's a good job I was busy at the time I can tell you. There are going to be some changes around here.

"Mr. Jackson" I said icily. "Now that we have exchanged greetings perhaps you can tell me what you want."

Actually it turned out to be nothing more than the line sync, which was put right by fitting a new 4.7M $\Omega$  base bias resistor (R33) in the sync separator stage on the i.f. unit. He was ready to go and looked round.

"I'd better say goodbye to the wee lassie."

"Oh no you don't" I said, fed up with this hanky-panky. "You just put your set in your car and hop it. All you Scotsmen are the same. Every day is new year's eve."

So off went Jacko and the wife came in through the front door.

## Guess Who Popped Back?

"I said cheerio to Mr. Jackson" she said. "But I was speaking to that nice artist fellow who lives up the road. I thought it would be nice if he could paint a picture of Pekey for us."

We have an elderly Pekinese in the family. He's not expected to be with us for much longer, but the thought of retaining an artist to paint the irritable little blighter (he bites me) seemed a little lavish, particularly since we had just paid our income tax, VAT, rates, etc.

"Oh well. We'd better think about that" I demurred.

"Well you'd better think of something, Mrs. Brashley's coming."

Oh no. What a day. What a terrible day. In danced Mrs. Brashley.

"Isn't it incredible? Just too incredible."

"Too incredible" I echoed.

"The sound's gone off. One minute it was there, next minute puff!" So while she related the rest of the day's good news to my honey pot, I once again took the back cover off the hated Pye. Good job it had only four turn keys and not ten thousand screws as on the Dynatron.

The audio output circuit is on the left side i.f. panel, and the supply to it comes via an 18 $\Omega$  resistor (R249). This is a small wirewound on the upper corner. It was open-circuit through no fault of the BD131 output transistors, a new resistor restoring normal operation.

## Ask a Silly Question

"What can we do with this terrible set?" enquired Mr. B.

"Why don't you leave it here and pop up every time you want to see something" I suggested, receiving a kick on the ankle from my lotus blossom.



more sophisticated of the two. The smooth discs allow the pickup head to move freely across the surface, making still frame, fast and slow motion etc. facilities possible. The technical details are as yet somewhat obscure – even to JVC in the UK! It's known however that each frame can be individually located, as with the Philips VLP system, and that stereo sound is available. The disc itself has been refined, and now lives in a caddy which is posted into the player. JVC claim that conventional disc pressing techniques can be used to produce the discs, and this should help to keep the cost down. No date for a UK launch has so far been set, nor has any price been suggested.

### Summary

The present position then seems to be that Philips are ahead with their high-technology VLP system, and having joined forces with Grundig and Sony could see their system adopted as an international standard. I recently had an opportunity to examine a Philips/MCA player purchased in the US, and was interested to note that many of the components are marked "made in Holland". It seems that

Magnavox (Philips' US subsidiary) are assembling the players from kits of parts shipped in from Holland. It's rumoured incidentally that the relatively expensive helium-neon laser may in future VLP players be replaced by a solid-state version. This would help in bringing the price down and make the player more robust.

No definite date for the launch of the Philips system in the UK has been decided upon, but Philips are considering the use of the Mullard Blackburn factory as a disc pressing plant – it's expected to be brought into operation later this year. So VLP could well be in the shops here late next year.

Selectavision is scheduled for nationwide distribution in the USA next year, and RCA hope to sell around 200,000 players at about £250 each during the first year. An impressive number of deals with software houses have already been signed, including Disney, 20th Century Fox, MGM, Rank and Paramount. No date for a UK launch has been suggested, and there are no plans yet for a PAL version of the player.

Detailed accounts of the Teldec and VLP systems appeared in the December 1971 and June 1974 issues of *Television* respectively.■

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# The Gypsy's Warning

*Les Lawry-Johns*

SOME years ago we were at the seaside. I think it was Margate, but then again it could have been Ramsgate. Since it was drizzling with rain or something, we couldn't stay on the beach. So we went into the amusement arcade, where we rolled pennies down pieces of wood on to a flat surface where they were collected by a nice lady who smiled. She seemed to collect a lot more pennies than she handed back, so I suppose that's why she smiled.

### A Visit to Madame Martine

Having lost all our pennies we ambled around until we came to a hut which had a big notice outside reading: "Clairvoyant. Madame Martine can look into your past and foretell your future." Amazing. Why live in doubt?

Well, I was only forty or so at the time but I seemed to have been in doubt for most of my life and what with all the funny things that were happening it seemed likely that I would remain so. Funny things like dual-standard TVs and radio sets that didn't need to warm up. Things that took a lot of thinking about. So I thought it was time I got myself straightened out by an expert. I'd tried self hypnosis, but every time I told myself to relax I went to sleep. So that was no good.

It wasn't easy to enter the dim interior of the hut and face a woman who not only knew all about my past but also knew what I was going to get up to in the future. But I did, and there she was sitting at a small table which had some playing cards and a piece of round glass on it. I suppose she played patience while waiting for uncertain people like me to pluck up courage and come in. She had a scarf round her head, so presumably she'd just washed her hair – but there was plenty of it hanging down and it looked dry enough. She fixed me with a piercing look from her black eyes. Perhaps she'd told someone something they didn't want to hear.

"Sit down my dear. You have a lucky face so you'll want

the full reading which is an extra two and six pence. It'll be well worth your while hearing about all the nice things that are going to happen to you."

"Do you know the lady on the penny roll stall?" I asked cautiously.

"Of course I do my dear. But do you want the full reading?"

"Not really. Don't bother about my past. Just give me a quick look into the future."

She didn't look very pleased to give me only the basic reading, and grabbed my left hand, opening it out and tracing lines upon it. Suddenly her eyes widened and she looked confused.

"What is it?" I asked in fear and trepidation.

"You're not sure of yourself, are you? In fact you're nervous of what might come." This was hardly astounding, since my hand was shaking like a jellyfish.

"What's to come?" I quavered. "Is it bad?"

"I can't reveal all" said the secretive bitch. "But beware."

"Beware?" I whispered. "Beware of what?"

"Beware the blue tants" she said mysteriously. "And that's all."

### Years Later

Bob was an insurance broker whom I'd known for years. A very conservative type, rarely ready to make any sort of change to his well ordered life. Until last week that is. He came into the shop and gave one of his rare smiles.

"Leslie" he said firmly. "I've decided to bring a bit of colour into my life. To make the golf more interesting, you see."

The upshot was that we unpacked a nice new Ultra 22in. colour set, fitted with the Thorn 9600 chassis, checked it and delivered it to Bob that same evening.

Now we've sold lots of these sets, and have rarely had cause to complain. Of course it had to be the one that

played about a bit we took out to Bob, and of course he had to live way out in the country up a dark lane and it had to be raining.

We found our way up the drive and installed the set which then worked perfectly. As it happened, and much to Bob's delight, golf was in progress. So we had a couple of glasses and dallied a while. It was as well we did, because after about fifteen minutes the colour gently faded out to leave a beautiful black and white picture with admirable grey scale. Believe it or not, Bob didn't even notice. His hero was in a bunker.

"Look at that" he said. "No trouble at all. I wish I could get out of trouble that easy."

"So do I" I concurred, with conviction, having lost all interest in golf.

I couldn't do anything until Bob had seen his fill. I then found that switching off, waiting for a few moments and then switching on again produced normal colour for a very short period.

Access is really good on these models. The left side i.f. panel can be swung up, allowing the decoder panel to be swung out. The print is beautifully marked (other makers please copy), and components can be located and identified without hesitation.

The decoder panel is a direct descendant of the one used in the 8000, 8500 and 9000 series, so we were on familiar ground. A quick check on voltages showed that the 8.8V which should have been present at pin 2 (supply pin) of the TBA395 reference oscillator i.c. (IC5) quickly fell to 3V or so, thus directing suspicion to the decoupling capacitor C186 (6.8 $\mu$ F). Unhooking one end immediately restored the correct voltage and the colour (thus proving that its value is hardly critical). The nearest value we had was 10 $\mu$ F, so in this went and harmony was restored.

"Part of the installation procedure" I explained.

Checked on a meter C186 gave no sign of leakage, but it was most definitely at fault. Oh yes: it was a blue tant.

We also found a blue tantalum responsible for low tuner selector voltages on another model, causing the programme numbers to flicker from one to another like a demented MOSFET i.c. would.

So remember, when you're up a dark lane and it's raining, beware the blue tant.

### Socket to me Baby

This chappie came in to buy a radio. After a bit of humming and hahing he decided upon one. Mains and battery.

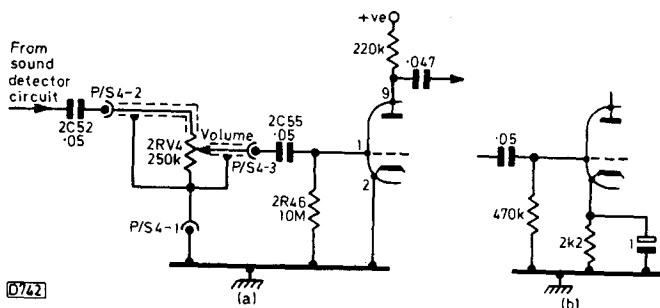


Fig. 1: Triode audio amplifier stage used in the Rank A774 chassis (a). A difficult case of hum on sound could be cured by decoupling the triode's control grid (pin 1). The only workable cure we could find was to introduce selective negative feedback in the triode's cathode circuit (b). The 1 $\mu$ F cathode bypass capacitor provides negligible decoupling at 50Hz. Introducing the 2.2k $\Omega$  cathode bias resistor makes it necessary to reduce the value of the grid leak resistor to about 470k $\Omega$ .

"Would you like me to put a plug on the lead for you sir?"

"No no, we've plenty of plugs in the house, but please put a socket on it for me."

So we put a plug on and away he went quite happily.

### It's Gorn Again

When the 24in. Bush monochrome set came in (A774 chassis) we thought it would be another line output transformer job. It wasn't. The tube was flat – just a dim grey, with silver highlights.

"Is it the picture valve?"

"No. It's the tube and that costs a little more."

"Can you put one in?" So we did, and the picture was lovely. Until the next day that is.

"It's gorn again. That new tube couldn't have been much good."

A new PL504 line output valve restored normal conditions and better relations. Until two days later.

About a year earlier we'd fitted a new line output transformer. This had now chosen to develop shorted turns. Fit new transformer. Nice picture. "Hope it lasts a bit longer this time."

It didn't. Back it came with overloaded video. A.G.C. checked, and suspect preset control plus suspect i.f. amplifier transistor replaced.

"I'm fed up with carting this thing down every few days. Will you come up to us if it gives any more trouble?"

"Certainly. But I shouldn't think it'll play around any more." It did, and I went. Nasty hum on the sound.

Change PCL86 audio valve. No difference. Check electrolytics as hum worse with the volume turned down. Electrolytics not at fault. Hum vanishes when triode's grid is shunted to earth. Check volume control, wiring, screening, plug and socket, valveholder, and finally suspect panel insulation. Cut away here and there but hum remains. Desperate. Fit 2.2k $\Omega$  resistor in series with triode cathode, shunted by small electrolytic, and reduce value of grid leak resistor from 10M $\Omega$  to 470k $\Omega$  (see Fig. 1). Hum now faint buzz, hardly discernible, but I know it's there and I don't know why. Could it be panel leakage, or is there a more subtle reason for the hum (and instability)?

Anyway, there've been no more complaints regarding the sound. Two days later however there was a call because it didn't work at all. Back again to find the on/off switch inoperative. Replace this and cross fingers, legs and eyes – because that was only a couple of days ago.

### Overheard in the Pub

The chap who was talking was getting on a bit and had been interested in radio years ago. The couple listening were of much the same age and greatly impressed.

"Take my last telly for instance. Kept having trouble with the bottom of the picture coming up, leaving a black band at the bottom. If they came once they came a dozen times. Each time they just put a new picture valve in and pushed off. So next time I knew what to do myself. Had to keep on though. Eventually the socket became so loose the valve wouldn't stay in. Got round that one! Glued it in firm. Lasted all right for a time, then the pins went all funny. Set had had it by then though."

"It just shows you, doesn't it?" said the lady. "They don't know their job properly. Take our set. Keeps getting twinkling dots across the top, right at the top they are."

The adhesives man gave his diagnosis. "It's the picture valve's grid that's loose. You just tell them to fit a new one."

# A Square Deal for LOPTs

Les Lawry-Johns

NOW as you all know I'm second to none in my admiration for the line output transformers used by Thorn: jelly pots are tops as far as I'm concerned. I ask you: how many times have you had to replace the line output transformer in one of the 1500 series sets for example, or for that matter the preceding 1400 or even earlier? Ah, you may say. What about the e.h.t. transformer in the 3000/3500 series? Not guilty we say: blame the tripler. Hissing Sid is guilty of knocking the jelly pot over.

In short (sorry!) we may say that the e.h.t. rectifier is more often the faulty item and that the transformer rarely is.

If we accept this proposition, who was the bright boy who, some years ago now, decided to incorporate the single-stick e.h.t. rectifier inside the line output transformer's overwinding? We are not referring to split diodes and windings, simply to an item which is at the end of the overwinding and could easily have been left outside for replacement. If one sticks to the letter of the BEAB regulations one has to replace the relatively expensive transformer simply because it has a defective inexpensive item buried inside the plastic housing.

If the rectifier has gone short-circuit, so that removal of the e.h.t. cap and any associated capacitor (which could have caused the trouble in the first place and would have to be disconnected anyway to prove the point) restores normal timebase working and the capacitor (if present) is in order, it seems reasonable to fit a new stick rectifier in a fully insulated housing on top of the line output transformer assembly, thus restoring the set to normal working without replacing the transformer itself. Such fully shrouded units are readily available, and come complete with e.h.t. cap and lead. So why not use them? We do.

The objection of course is that the defective rectifier may have a high-resistance leak, which would cause sizzling and varying e.h.t. on bright scenes or when the brilliance is advanced. So far however we've not found this to be the case. Apparently when they short they short – and good. This of course is not what we're on about: why put the stick inside in the first place? Greater reliability? Safety? I doubt it.

## More Moans

Having groaned about the Thorn 1690/1691 series portables (oh, that's what he was on about), let's have a groan about the cheaper imported portables which keep coming in because the stores that sell them are loath to repair them. They appear with the most unlikely names adorning the front fascia, but are usually much of a muchness.

There seem to be two common failings. One is caused by the use of underrated diodes in the mains bridge rectifier circuit. Even if all four diodes haven't cooked up and taken the supply leads with them (due sometimes to incorrect battery connections) it's still essential to turf out the lot and fit more robust diodes and preferably a series fuse if one isn't fitted.

The other common failing is caused by the use of unreliable transistors in the a.g.c. circuit. The customer's complaint will be that the screen lights up but there are no vision or sound signals. Oddly enough, the transistor usually responsible stands up on long legs somewhere at the

front of the panel, like a sore thumb. A quick check with an ohmmeter will establish whether or not this is the guilty party. Probably in the set you next get for repair the guilty transistor will not be so obvious, but it doesn't take long to check each suspect, and hopefully the print will be marked B, C and E to enable you to use a transistor of the type you have in stock, say a BC108 or a BC148, with the base in the middle, assuming it's an npn transistor of course. There's a fair amount of design variation so we can't be too explicit.

Having said that, we must now confess it wasn't all that long ago that much time was spent in checking the a.g.c. and the i.f. stages of one particular portable only to find that the tuner was responsible after all, and we've yet to find out how this could have rendered the i.f. stages well nigh inoperative.

## Mrs. Ferguson's HMV

Have you noticed the number of complaints of late about turntables not playing new records properly? I rather suspect that this is really down to the record makers, but not being an expert on anything I'm not able to say for sure. We're expected to cure all the ills that afflict the home entertainment scene however, and a pick-up arm bouncing around on a new record is not conducive to harmony in the home. Hence the arrival of Mrs. Ferguson, with her HMV stereo, an Indesit T12 portable and a son who was a Hi-Fi expert.

Ernest (the son) immediately launched into an explanation of what was wrong with the stereo unit and what was needed to put it right.

"It obviously needs a better cartridge, one with better tracking capability – say a Shure V15 type IV – but I doubt if my mother will spend eighty quid or so on a decent cartridge and anyway I don't suppose you would keep such good, er . . ." He didn't complete the sentence, but I guessed he was casting aspersions upon my what's-its-name.

"If the cartridge is not at fault, which it isn't, she would be wasting her money if she followed your advice" I mumbled. "Why don't we find out what the trouble really is, if there is any?" Mrs. Ferguson then got her bit in.

"Shut up Ernie," which was a good start I thought. "If we leave it with you, perhaps you can sort it out and ring us when it's ready and perhaps have a look at our portable telly – everything looks long."

And off they went, Ernie still on about the stereo needing equalisation to prevent cross-talk between the tracks or something technical like that.

As it used a Garrard deck, we immediately removed the turntable and checked on the free movement of the changing cycle actuating plates. These as usual were a little stiff, but not as tight as we have known them. Sometimes we've found the plates completely immovable, which must have meant intense discomfort to the end tracks of the records played under these conditions.

So off next came the changing wheel (I know it has a proper name, but I can't recall it at the moment) and off came the upper and lower plates to enable the spindle to be freed off in its bush, which is where the trouble originates. Having ensured that they could freely flop about, we reassembled the unit and tried several records. All played through to the very end without incident, including my all-

time favourite "Night in a Turkish . . ." (censored by the editor).

I still had doubts about the performance of new records on it, in view of Ernie's comments about tracking capability, but I had shot my bolt and could do no more since the arm was as free as a bird and the weight was right.

The Indesit was where I really came unstuck. The complaint was excessive height, which was obvious as soon as the set was switched on. Since access to the height and linearity presets is through holes in the aerial input moulding, I assumed that no one had been at them and immediately started checking components in the height and linearity circuits, removing the tuner unit in order to gain easier access.

Everything appeared to be in order – capacitors had capacitance and didn't leak (even the tant), resistors had the correct resistance, the presets were intact, and the driver transistor was in order. I didn't suspect the output transistors in view of the nature of the fault.

It wasn't until I reduced the height control setting that I discovered that the bottom came up but the top didn't reduce at the same rate. Adjusting the linearity didn't have much effect, so now we had a much more familiar symptom which directed attention to where it should have been directed in the first place (and would have been if we'd thought about the possibility of Ernie twiddling with a fine screwdriver through the plastic moulding of the aerial panel).

A quick check on the output transistors revealed that one had an open-circuit junction and the other a slight leak on a reverse reading. So out they came and in went a new pair. All that messing about could have been saved if I'd followed my own advice: always check first the things that run warm, or where there's heat there's a probable trouble spot. This was the first time I'd found the output transistors at fault when the complaint was excessive height.

### **A Philips K80**

A friend (?) asked me if I'd tackle a set that had really got him losing sleep. It was a Philips S26K414 (K80 chassis) and I hadn't seen one before, so they can't be all that thick on the ground. I'd had many a battle with the earlier K70 however, so I thought I'd stand a sporting chance. Having a 110° tube it's not as bulky as the K70, but at first glance with the rear cover off it has the same unnerving effect, due to the sheer mass of circuitry.

The problem, which I got second-hand, was that the present "no raster" condition had been preceded by incorrect grey scale and no proper colour signals.

Screwing up courage, we made a tentative start. Switching on produced an initial bright glow in the valve heaters, particularly the PL802 luminance output valve. I was also pretty sure I saw a spark inside this valve. The top right line output section houses the two PL509 valves and a PY500. Under these is the line output transformer, and under this again is the tripler.

I heard the e.h.t. rustle up, so this was one relief. Another was that the sound was present and of the expected high quality – the set has a tweeter and woofer.

Since the e.h.t. was present, the obvious course was to check the c.r.t. base voltages. The first anodes were at just over 500V, so no problem here. The grids were also about right at a little under 100V (the grids are driven by three PCF200 colour-difference output valves). Next, as expected, the cathode voltages were high – about 240V. So there didn't seem to be too much of a problem after all – fit a new PL802 we thought and all would be well. A new PL802 produced no voltage drop at all at the c.r.t. cathodes

however, so it was time to take a closer look at the luminance output stage.

With the chassis let down to the extent of the knot in the retaining cord, we chased the white luminance lead from the tube base to the print near the PL802. The anode load resistor was found to be a hefty 5.6k $\Omega$  wirewound type, and there was only about 20V across it – so clearly the PL802 wasn't passing much current. Its cathode voltage was about 2V, and there was a slight negative voltage on its control grid. With a knowing wink, we decided to get a more healthy current flow: with the meter still connected to the anode, and recording 240V, we shorted the control grid to chassis to remove the negative bias. To our astonishment, the meter's reading didn't budge from 240V.

Measure the negative voltage on the grid more carefully – just a little over 2V. Now I'm no mathematician, but the removal of a 2V negative bias on the grid should have produced a marked increase of anode current. The fact that it didn't suggested that the new PL802 was not up to scratch. Fit another. Results identical, so I bashed my head on the bench just for fun.

All right I thought, if removing the grid bias doesn't do anything, let's remove the cathode bias instead. Connecting the cathode to chassis resulted in the anode voltage falling to 70V and to my mind becoming a complete blank. Daft as a brush, I checked the continuity of the grid socket of the valve base to the print, and of course it was o.k. I then checked the continuity of the cathode socket to the print. Again o.k.

Just for fun, check from the cathode pin to chassis. Something like 400 $\Omega$ . 400 ohms? It should have been 27 $\Omega$ . I then remembered the spark in the original PL802. With the damaged 27 $\Omega$  resistor replaced, the anode voltage dropped quite nicely and there appeared to be something on the screen, which was mainly green, but what was there kept changing around so much that I concentrated more on what the voltages were at the tube cathodes. These were fluctuating around pretty wildly, though the voltage at the white lead input remained steady.

We then took a closer look at the tube base panel, and wished we hadn't. On the bottom of the panel is a plastic housing which contains four sliders to enable the highlights to be set slightly differently for monochrome and colour. The selector switch is on the right side, operated by a solenoid powered by the colour-killer – which confused me all over again.

It was clear that the sliders were not contacting the resistive element properly, and furthermore couldn't be made to do so, hence the varying tube cathode voltages. Having failed to improve the contact we decided to bypass the presets and switches, applying the luminance signal directly to the cathode resistors. The result was a weird but fairly steady picture, which should have been in monochrome but was so badly converged and generally set up that we had to start from the very beginning with purity, convergence, grey scale etc.

The convergence panel pulls out from the front once the two rear fixings have been released. At last a reasonable monochrome picture was resolved, but the contrast control was inoperative. So we wearily set about finding the reason for this. Since the contrast control operates on the control grid of a PCF80 valve (triode section) on the top centre panel, we thought we would find the source of the trouble here. Not so! The PCF80 triode cathode voltage was too high (about 7V instead of 1.9V), but to find the cause of this we had to trace back down on the main signal board – to the second chroma amplifier transistor (BF195), which had a base-collector short. Ah we thought, we can kill two birds

with one stone. Replace this and we'll not only regain control of the contrast but we'll also restore the colour. We regained control of the contrast all right, but of colour there was no trace.

Since signals were now passing through the chroma amplifier, but nothing worth mentioning was coming from the detectors, it seemed that we next had to lean heavily on the reference oscillator. We were about to do this when Mrs. Crooke burst in.

### Negative Picture

Mrs. Crooke was in such an agitated state that I had to forget about the K80 for a while. It was put down and Mrs. Crooke's Bush was put up in its place. She was a small woman who seemed never to stop talking (shouting) – even to draw breath. I wondered if she knew Mrs. Brashley, but couldn't get a word in edgewise to find out. The torrent continued while I was trying to find out what was wrong, and I didn't really pay much attention to what she was saying except to the bit where she said that the reason she had brought the set in was that her husband worked all hours at the office and rarely arrived home until late at night and then went straight to bed. I wondered why.

The Bush A823 was not functioning because the l.t. line was very low, though the a.c. input to the bridge was normal. Since the fuse was intact there were clearly no shorts, so it was pretty obvious that the bridge rectifier was at fault. It read all right on an ohms test, but it was a green one and green is not my favourite colour. We had the option therefore of putting in four diodes or a black BY164.

The never ending chatter was putting me off my game, so I suggested that Mrs. Crooke should pop off round the shops for half an hour or so. Mrs. Crooke scratched the

cat's head (Spock had been listening impassively during the tirade, and it was about time she came in for some attention).

"Your dad's fed up with my chatter darling. He wants to get rid of me so he can do his work properly. I do talk too much I suppose. Everyone tells me so. But you don't mind do you my sweet? Cats are much better than people, especially men." And off she went, leaving Spock and I feeling sort of drained.

Not feeling energetic enough to fit four diodes, I popped in a nice new BY164 and was comforted to hear the e.h.t. come to life and the sound come on – even if it was two women chattering. The comfort didn't last long when I looked at the screen. The picture was completely black and white but reversed, i.e. negative.

I was fairly sure that the SL901B i.c. in the decoder was responsible for this condition but couldn't figure out how the loss of the l.t. line could have caused it to go. Mine's not to reason why however, and fitting another chip restored normal operation.

I'd just finished writing out the bill when Mrs. Crooke returned, presumably from a brief encounter with the hind legs of a donkey, making a bee-line for the cat. Off she went, nattering away ten to the dozen – until I handed her the bill that is. There was a deathly hush. Unearthly it was. You would have thought it was a ransom note.

The wife ran in to see what all the quiet was about. "You take the money from Mrs. Crooke dear" I whispered, coward to the last, "and I'll put her set in the car for her". When I got back Mrs. Crooke had regained her composure and was talking about the cost of living, having handed over three fivers and received her change.

The K80? Well, the above took place only an hour ago, and I haven't got back to it yet.

## Surplus Tuner Control Unit

Hugh Cocks

DURING a recent visit to Sendz Components I came across an interesting varicap tuner control unit that could prove useful to TV set constructors. The unit was made by GEC and has eight channel selector switches. Only a very light touch is needed to change channels. A large nixie tube displays the selected channel.

The unit is designed to be mounted in the set vertically, by means of the bracket on its left-hand side. When the whole unit is depressed, the innards spring forward giving access to the tuning potentiometers.

Fig. 1 shows the panel arrangement and the inputs/outputs, which are straightforward. When one of the selector buttons is depressed, a feed to mute the a.f.c. circuit to facilitate channel selection is obtained at pin 10 of the 14-pin connector (note that pin 1 of the connector is towards the centre of the board edge, pin 14 towards the corner). Pin 11 is connected to a switching transistor and can be used to adjust the time-constant of the flywheel line sync circuit for VCR use (the original model used a TBA920 sync/line oscillator i.c., the switching transistor being used to short-circuit pin 10 of this i.c.). The transistor switches on when channel 8 is selected. Pins 12, 13 and 14 are connected to a Band I/III/UHF selector switch associated with each channel. This can be ignored for ordinary UK use, though some DXers might wish to make use of it.

In the original design the TAA550 tuning voltage stabiliser i.c. was mounted on the i.f. panel and fed from

R18 on the control unit via pin 5 – the idea was to prevent the TAA550 overheating when its loading (the tuner control unit) was disconnected. It's a simple job to add a TAA550 and bypass capacitor (say 0.005 $\mu$ F) on the PCB side of the control unit – positive side to pin 5, negative side to pin 3, with pins 4 and 5 linked. There are four i.c.s on board PC677.

The unit is currently available from Sendz Components at £5.00 plus 30p postage and 15% VAT. A full circuit is supplied.■

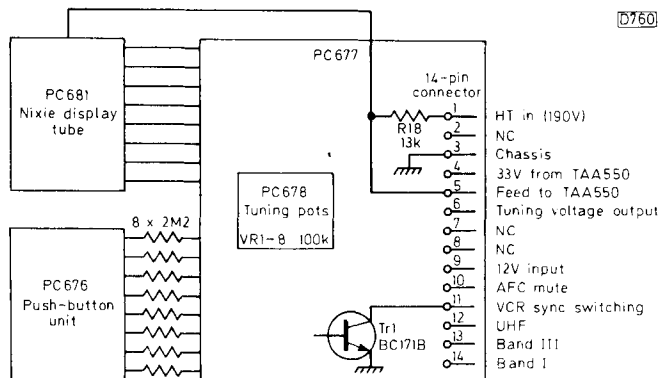


Fig. 1: The panel arrangement used in the surplus varicap tuner control unit, and the connections to the fourteen-pin connector.

white polythene box. The aerial input connection is via a standard, good quality 75Ω coaxial socket while the output is via a flying coaxial lead approximately 15in. long terminated with a reasonable quality coaxial plug. There's a substantial SPST toggle on/off switch. The PP3 "floats" within the box, the snap-on lid holding things stable.

At £7.70 plus 30p postage I call it very good value, and I'd certainly recommend it to anyone wanting a high-gain, single-channel u.h.f. preamplifier.

The BF183 is a comparatively old device. The use of a BF362 or BF479 in the first stage would give even better performance. With a BF362 you could probably increase the voltage gain by 3dB and, more importantly, reduce the noise from around 7dB to 5dB. With a BF479 an even

better noise performance — perhaps 3.5-4dB — could probably be achieved. These figures apply at 800MHz. An experienced constructor might also consider adding an input tuned circuit to achieve greater selectivity. A BF362 or BF479 would require little or no alteration to the biasing when trying the change out to see what improvement in system performance could be achieved. Personally I prefer to use a diecast box, in the interests of screening and rigidity.

The points made in the previous paragraph are suggestions for getting even better performance from the unit. The amplifier in the form supplied does however give excellent results and is wholly adequate for normal domestic use.■

# Tubes

*Les Lawry-Johns*

TUBES are the subject exercising our little minds this month. They are of all sorts. Most are alive, like trees, snakes and people. Take people for example. Long tubes with a hole at the top equipped with a mincing machine to break down bits of other tubes. And with two sticks at the same end to grasp the food and two at the other end to enable the food to be sought and collected. Trees are much more efficient, staying in the same place while sending down their lower sticks in search of sustenance. Also they don't need all the bits and pieces people, and other animals, require around their tube — pipes, pumps and filters, with a central control system at the top. Trees don't need such paraphernalia and therefore live a lot longer. Snakes are also more advanced than people: no sticks, just a basic tube, having taken a leaf out of their lowly cousin, the earthworm's, book. We seem to have a long evolutionary path ahead of us before we can stand still like trees. I've probably got it all wrong however, which leads me to the next bit which I've also probably got wrong but has been causing some concern lately.

## **Rebuilt colour tubes**

It's our custom to keep in stock a few rebuilt colour tubes of the more common sizes, so that customers aren't kept waiting for more than a few hours and the cash flow is maintained. There seems to be an unexpected snag in this desirable state of affairs however.

It would appear, and we stand to be corrected, that if a tube is taken fresh from the ageing process (the final part of the rebuilding procedure) and installed, tested, converged, etc. there's very little trouble. If the tube is held in stock however, say for only a few days, when it's fitted the emission is below standard and shows symptoms of muddy colours, flaring etc. When placed on test the guns show poor emission which can be restored only by reageing, i.e. overrunning the heater and applying the standard positive potential to the grid in relation to the cathode, measuring the resulting current flow in milliamperes. Some 15 minutes or so may have to elapse before the accepted 60-70 milliamperes can be achieved — and maintained when the heater voltage is returned to 6.3V.

If this is done and the tube is put into use, no further

trouble is experienced. If it's not done and the tube is left working the resulting picture will be inferior and will remain so, i.e. it will not "bed itself in" or "age" itself.

You may say that this is because we have employed rebuilt tubes from one source and that this source has not used hot pumping or has not aged the cathodes for a long enough period. This, as far as the first two points are concerned, is not so. We have used tubes from several sources. Hot pumping is definitely used at least at one of these sources, which we've visited.

It's the ageing process about which we're in doubt. How long should this be if the cathode material is not to revert towards its inert state when not put into immediate use? These notes are not the result of a few isolated instances. They are based on experience over several years, and we now always check the emission of rebuilt tubes which have been held in stock for any period before using them.

There now. I've already been given ten thousand reasons why all this can't be, and if you want to add to this by all means do so. But just check that tube before you fit it if it's been laying around for a while.

## **It keeps going dark**

When Mr. Bristol brought his set into the shop we didn't expect to have the trouble we ended up having. It was a Bush colour set fitted with the A823 chassis. He said the picture kept going dark and off tune. So we checked the tuner and found the nylon collars on the threaded rods in various stages of decomposition. To save time, we stuck on our spare assembly and refitted the tuner. It stayed in tune and the picture remained bright.

Back he came the next day to say that it still went dark. So we put it on a soak test. It remained bright until it was moved, after which the picture could be seen only with the brilliance control fully advanced — and even then only the highlights were in evidence. When the set was moved to gain access normal brightness returned and of course remained despite persistent prodding etc.

When at last the screen did darken, the cathode voltages were found to be correct and we were just in time to record a first anode voltage of about 250V on the blue gun before it shot up to about 500V and the brightness returned. "Ah ha" we said, but it didn't do us much good. Over a period the first anode voltages varied, and we leapt from the convergence panel where the presets are mounted across to the scan control panel where the supply comes from several times, each time becoming more frustrated.

There was no leakage on the convergence panel, and indeed the voltage was coaxed to vary with the supply removed from this panel. So we were back with the 2.7kΩ resistor 6R7, the rectifier 6D2 and the reservoir capacitor

6C13 (see Fig. 1). We prepared to replace the latter, only to find a dry-joint at one end. Not leakage after all, simply the intermittent lack of a reservoir.

As soon as the joint was remade the first anode voltages returned to normal and stayed there. It's one thing to know you've definitely cleared a fault, another thing to convince the customer. Two days later however Mr. Bristol popped in to say that everything in the garden was bright and cheerful.

### A naughty 3000

In the meantime we'd encountered another mystery. A bulky brute with folding doors, an HMV label and a Thorn 3000 chassis. It seemed to have just about everything wrong that this type of set can have. The main trouble however was that an initially indifferent picture would slowly go out of focus, become a bright blur, then disappear.

More in hope than conviction we changed the tripler. No difference. The old tripler felt quite warm however so the tube must have been drawing a fair amount of current. We next noticed that when the picture became a blur the tube neck became blue. So we immediately accused the tube of becoming soft – a severe cold was playing havoc with our reasoning (which is not very evident at the best of times). After an all round general panic, during which measures were taken that I'm ashamed to relate, we started to behave more rationally. We unhooked the tripler and took voltage readings at the tube base. Previously these hadn't made a great deal of sense. We now found that the cathode and grid voltages remained reasonable, but the first anode voltages (yes again) on all three guns increased to over 1kV – in fact were probably higher than this, allowing for the effect of the meter. My nose blowing assumed force nine proportions.

We eventually discovered that the first anode supply earth return resistor R727 (see Fig. 2) read right when cold but became open-circuit when heated. After replacing this the picture remained in focus and we were able to clear the hundred and one other faults which could now be seen.

### Caught again

Having made a complete mess of a simple repair on an HMV set we next proceeded to butcher an innocent Dynatron set fitted with the Pye 691 chassis. The complaint was that it went out of focus after ten minutes or so, becoming a complete blur with the width coming in to denote overload conditions.

Our ice cool reasoning was impeccable and, of course, wrong: either the cathode voltages are dropping due to a fault in the PL802 luminance output stage (not so – the cathode voltages were fairly steady at about 200V), or the tripler is faulty – in which case it will be hot. The tripler was indeed hot, so we proceeded to replace it – which is easier said than done in the 691. Manfully we tackled the job, and finally had the lot back together.

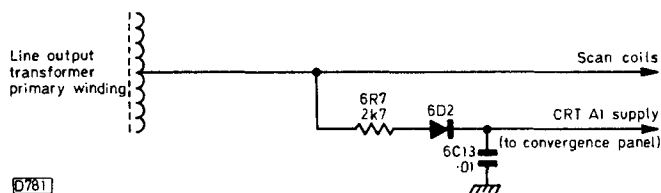


Fig. 1: A dry-joint on the c.r.t. first anode supply reservoir capacitor 6C13 caused intermittent loss of brightness in Mr. Bristol's Bush colour set (A823 chassis).

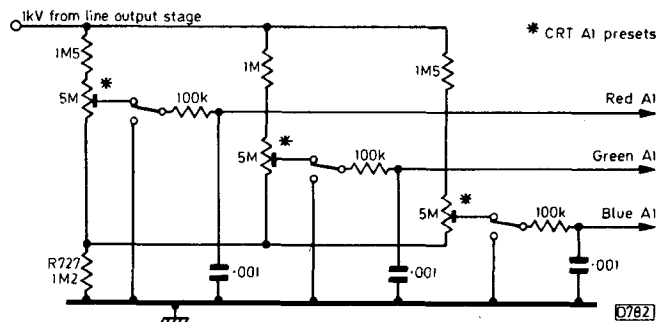


Fig. 2: A particularly nasty one this, on the Thorn 3000 chassis. When warm, R727 would go open-circuit, with the result that the c.r.t.'s first anode voltages became excessive. The symptoms were loss of focus, the picture becoming a bright blur then disappearing.

We switched on and started to write out the bill. As we did so we became aware that something was wrong. We heard the e.h.t. rustle up but no picture appeared. Hurriedly we checked the tube base voltages again. Cathodes o.k. First anodes o.k. But whilst there should have been about 100V on the grids there was a heavy negative voltage instead.

I was well aware that we'd had this trouble more than once before, but what with a thick head and old age I couldn't remember what had caused it. "Clamp pulses, clamp pulses" I thought blearily and checked them and the clamp triode grids and cathodes. Not at fault. Faulty PCL84? Not so. Oscillation due to lack of decoupling? Then the penny dropped. Sure enough, an electrolytic on the h.t. supply line to the CDA panel restored normal conditions, and of course the main smoothing capacitor was open-circuit.

A replacement was fitted and the picture appeared quite good for about five minutes. It then started to go out of focus. . . . Back to square one. Why wasn't I born a cat or a dog? All they have to do is watch me making a fool of myself. I'm not very good at being a human.

I rested my hand on top of the cabinet and hung my head in despair. The cabinet was warm over the top of the long focus unit. Touch the focus unit. Hot and getting hotter. The plastic was melting before my very eyes! Off off, switch the thing off. The focus unit continued to bubble and no wonder, since the VDR was acting more like a fire bar element than a focus rod.

Once again I remembered. Pity I couldn't have managed to do so before fitting the tripler. I'd even written about it a couple of years ago. A new focus unit restored reliable operation, but I didn't feel so good.

### The K80

Oh yes, I nearly forgot. There are three chroma amplifier stages in the Philips K80 chassis. I had replaced two of them and finally reached the third which is way down on the panel where the print side is obscured by the power unit. The latter had to be removed to gain access. All three transistors had apparently been blown, presumably by an accidental short on the tube base holder where a solenoid is activated when the colour-killer circuit supplies 25V to it and the chroma amplifiers. I suppose the sudden application of 200V from an adjacent cathode connection would upset things a bit.

Have you ever tried to converge a 110° delta-gun tube when there's an unsuspected dry-joint on one of the controls?



# One Damn Thing After Another

Les Lawry-Johns

I must confess to feeling very sad occasionally of late. Little seems to buck me up very much, and I seem to make so many daft mistakes. Look at what happened yesterday for example. The phone rang, as phones do.

"Hallo. Hoodo Yoovue" I said, trying to cheer myself up.

"Don't muck about. I know it's you" said a voice I knew fairly well.

Then I remembered. It was Mr. Gay, the funeral director.

"Hallo Mr. Gay. How's business?"

"Not bad. Could do with a good epidemic though. Anyway I called you about our set. Can I bring it round?"

And that's how it came about that a damn great hearse drew up outside the shop and two men clad in black solemnly opened the back and carried in a set with all due ceremony. It needed only an organ and some lilies to complete the picture.

In those brief moments my mind filled with all sorts of ceremonies that could be carried out on TV sets, including cremation. But I never said a word out of place.

The set was a Thorn 8800, and the complaint was that the sound was there all the time but the picture kept going.

## A Solicitous Enquiry

Off went the undertakers, promising to return later in the day. They had hardly departed when the inevitable happened. One of the local old girls popped her head in the door.

"Has she gorn then?"

"Has who gorn?" I asked, quite unnecessarily since I knew perfectly well the old ghoul was hoping that someone had passed under or over or whatever people do when they pass on, and since I was in evidence she must have thought that honey bunch was deceased.

"The missus" she said. "I saw the undertakers and I thought they'd come to straighten someone up. My daughter can come in and clean for you if you like."

"There are still a few more years of cleaning left in the missus" I said, "she hasn't shuffled off, but thank you for asking just the same. They didn't come to measure anyone up, only to bring a set in."

The old girl wandered off disappointed, muttering something about people didn't ought to be allowed to make other people think that someone had died when they hadn't.

## Now to the Set

So we turned to the Marconiphone (and we won't see that name again on a new set, at least not from Thorn), and switched it on to see what all the fuss was about. There was a loud pop as the mains filter capacitor threw in its hand and the fuse disintegrated.

Having made good that diversion, we tried again. All now seemed well, with a fair picture and sound. This continued for some time, then the picture became a mass of noise and the sound became hissy. It looked like a tuner fault, but as we were not born yesterday we decided to take a look at the lower left side of the signal panel. A slight touch on the i.f. input plug from the tuner confirmed that this was indeed making poor contact, as it so often does on this type of

panel (8000 on up to 9600).

Having cleaned the contacts, normal service was resumed for about five minutes. Then the sound failed completely. This time it was the MJE340 sound output transistor which had departed this life. A BD410 was fitted in its place and all now seemed well. So the set was wrapped up to await the undertakers' return.

## Return of the Little Old Lady

Some time ago we related how we were made to feel decidedly uncomfortable when we had hysterics in front of the Vatman after a dear old girl suddenly appeared to buy a new Pye CT450 (G11 chassis). Well, she appeared again the other morning. There she stood in the middle of the shop, looking just as hesitant as before.

"Hallo Mrs. Wandless, come to buy another new set?" I enquired cheerfully.

"I didn't want to" she said quietly, "but the one I bought seems to have worn out. The one you sold Mrs. Powe two years ago still seems to be going all right. Why has mine worn out so quickly?"

"It hasn't worn out Mrs. Wandless, it's just a little thing that's stopping it coming on. I'll pop out this afternoon to make sure it's still connected up properly."

"I don't think you'll be able to. The man next door came in and he couldn't make it work."

We let that one pass and arranged a time to call.

So during the afternoon we arrived at her house with some fuses in one pocket and some diodes in the other.

Just to be sure, we checked the 5A plug fuse first and then inserted the plug and switched on. The set burst into life and I looked askance at Mrs. Wandless who was standing in the middle of the room looking lost.

"It didn't take you long to mend it, but I hope you won't have to come all this way every time I want the set on."

"Oh no" I said without conviction. "It'll come on when you do it." So saying I switched the set off and removed the mains plug (which was her habit). "Now you do it and you'll see."

"I don't think it will" she said.

"Try it and see" I encouraged her.

So she did and it didn't.

Swallowing hard, I removed the rear cover and checked around with the meter. Mains o.k. at the fuses on the input panel. H.T. o.k. at the power panel. H.T. at the line output transistor and the line driver, but no drive at the base of the driver. Move over to the timebase panel.

As soon as I touched this panel the set burst into life and no amount of prodding would turn it off. So it seemed that the start-up circuit was at fault. Close inspection revealed a dry-joint on the print to R2010, the 5.6kΩ wirewound start-up resistor. Resoldering this restored normal working each time the set was tried, but it took a little time to persuade Mrs. Wandless that the set would work after I'd gone.

## A Handsome Amplifier

A chappie brought in a rather handsome Rotel amplifier the other day. "I wonder if you'll have a look at this. It

seems to be dead." I accepted the job thinking it would turn out to be some sort of short that had blown a supply fuse.

When I got round to it, I removed the case and found an envelope inside containing some ten or twelve transistors – outputs, drivers and preamplifiers. All had been neatly removed from the panel and the heatsinks. That was enough. From bitter experience we know all too well that this would be only the tip of the iceberg. Once a job like this is started, it inevitably leads from one minor disaster to another until the repair bill assumes massive proportions the owner will not accept. The fact that he (or someone else) had already been at it showed that economy had probably played a part in the tragedy, and we'd no wish to join the cast. Sorry old chap. It needs to be taken to an expert.

### ***Unit Audio Wouldn't Go***

I never really got to grips with the next one. Perhaps you can.

A lady sent her unit audio in because it wouldn't go. There was an additional note that when it did it was too loud, so would it be all right to work it without the loudspeakers connected?

Only the unit had been sent (no speakers), so we put it on the bench and connected our test speakers. Continuing with our boobs we put on a record, got nothing and proceeded to remove the bottom cover in order to find a possible amplifier supply fuse blown – the turntable was working fine.

All the supplies were in order, so we suspected a faulty headphone socket. Plugging the headphones in proved that the unit was working well, and it was only then that we realised there was a headphone button on the front panel. When this was actuated the sound came normally from the speakers, and we were again wasting our time since there was nothing wrong with the unit at all. Remembering the note that it was "too loud" we checked the volume controls and found that these worked perfectly down to zero.

When the lady came in to see if we had repaired the unit we told her that there was nothing wrong except that the headphone button had been depressed. Then it started.

What was the headphone button? Where was it? What was it there for if she didn't have headphones to use, and if she did have them where were they and what did they look like?

I could hear my lotus blossom giggling like a loon as she pretended to rearrange the window display.

The lady then informed me that she had had the unit for five years and the button had never been pressed in before. So why should it have been pressed in now? By accident I suggested, but now she knew what it did she could check on it herself.

### ***Too Loud***

Then she wanted to know if she could leave the loudspeakers off since it went too loud.

We explained that all she had to do was to slide the controls to reduce the sound to the required level and, if she wanted the speakers off altogether, to push in the headphone button.

"Which is the headphone button? . . ."

Perhaps she preferred the sound coming from the stylus only. Which brings us to the next funny thing.

### ***Music Centre Problems***

A music centre came in with a complaint about the cassette section. This was eventually traced to poor

contacts on the edge connectors (intermittent loss of oscillator bias to the record head). Having cleared that headache up we thought we'd better check the radio and the record player sections. The radio was o.k., but when our test record was put on it sounded most peculiar.

Now whatever may be on a test record, if you've played it hundreds of times you know every tiny piece on it and can immediately spot a difference. This particular one was a vocal, and a solo vocal at that. There were two voices however, one preceding the other by exactly one line of the song – as though it had been arranged that way, but I knew it hadn't.

All sorts of possible gimmicks presented themselves to my mind and were promptly dismissed. I then took a look at the stylus and found it twisted so that both the tip and one edge were riding in the grooves at the same time, the sound from the edge not being very inferior to that from the tip.

The customer hadn't mentioned this added facility, but I wondered whether his records had appreciated it. My test record seems not to have noticed, but it doesn't sing a duet now. I'm expecting the owner to ring up and complain that he no longer has a double tracking capability.

### ***Mr. Pinchpenny's Portable***

When Mr. Pinchpenny popped his ITT Featherlite portable in, he popped the inevitable question. "How much will it cost?" Since at the last count he was worth about ten million we didn't actually give him an estimate, merely saying that it would probably break him. This provoked no more than a wintry smile, and he left promising to return on the morrow. He gave a quick look at our colour portables on the way out, and visibly shuddered at the price.

The complaint was that the picture would become very grainy on occasions, while on others it would distort and lose hold. The first complaint we attributed to a dry-joint in the varicap tuner (right), the second to faulty bridge rectification (wrong).

### ***The Graininess Came and Went***

We found that by giving the tuner an affectionate squeeze the graininess would come and go. We usually take the tuner out and go over the soldered joints around the input stage, also any others that may look a trifle suspect, then refit the tuner for test. If there's any further trouble we fit a new one. In fact the soldering proved effective on this occasion, so Mr. Tightfist was saved a few bob on this score.

### ***Supply Line Trouble***

The bridge rectifier proved to consist of four hefty diodes which didn't respond to hair drying or freezing. Evidence of poor smoothing came and went at random however, and was unaffected by shunting each diode in turn with a 1N5408. We then turned our attention to the main smoother, clipping another in its place. The curvy verticals etc. still came and went, but now at about half-hour intervals. Initially it seemed as if the electrolytic had done the trick. But no. We eventually turned our attention to where it should have been turned when doubt first arose – to the series regulator transistor, which in this model is in the negative return from chassis.

We replaced the regulator transistor, using a BD203, and had no further trouble. We'd wasted a lot of time however through not suspecting a regulator fault as a result of doubts about the bridge and the smoother.

We'll doubtless be chatting about bigger boobs next time.

# The Magic Set

Les Lawry-Johns

ONE of our problems recently has been a running battle with the GEC C2121 (and others of that ilk). I'm dreading the next one in case it's anything like the last few.

Take Mr. Rockbottom for example. Some time ago we had cleared a simple case of "stuck on 3" by thoroughly cleaning the touch sensors. When he appeared the other morning we thought it would be a repeat performance, since he does have this habit of gnawing chicken legs whilst watching TV and does occasionally forget to keep one finger clean for touching the sensors when a change of channel is required.

"It's not muck in the buttons this time Les" he puffed. "I've cleaned them out thoroughly with the wife's gin."

"Pity she's not a meths drinker Mr. Rockbottom, but let's have a look at it."

So up on the bench it went, where the sensors proved to be as clean as a new pin. On switching on neon 3 lit up as it should do, but on touching sensor 2 neon 1 came on and whatever you did it went back to 1.

To my unscientific mind it seemed that the ETTR6016 i.c. on the preset control panel was faulty, so we earthed ourself with a length of braid under our metal watch strap since we can't afford an ankle chain.

We carefully took a new chip out of its foil, and noted that it was the last of the quil type. When we'd fitted it we had a completely different set of conditions. It no longer lingered on 1. The two right side neons flickered on and off all the time, though the left side channels could be selected – but not reliably.

"Faulty chip" I thought.

Since the other chips in stock were of the in-line rather than the quil type I decided to fit a quil-to-dil holder to facilitate further mucking about. This done, I fitted the first one. This gave totally different results, but anything other than those required, and I was becoming slightly confused since neon 3 wouldn't light up at all.

I next declared war upon the neons. First I changed neon 3. This then lit up at switch on, but when I touched sensor 2 neons 5 and 6 flickered and neon 2 refused to light. So I changed neons 5 and 6 and everything worked beautifully. All channels could be selected and would stay selected.

Later that day Mr. Rockbottom returned. We put the set on the counter to show him how clever we'd been. Hooked it up and invited him to change channels.

"It won't change" he said in a rather flat voice.

"Of course it will" I assured him cheerfully, but with a cold chill creeping up my spine. I leaned over and touched the sensors. Every channel selected impeccably. "There you are."

"It won't change for me."

I impatiently charged round to the front of the counter and ran my finger along the sensors. Nothing happened. It remained on 3. I charged back to the rear of the counter to look for the large scissors so that I could snip my arteries and put an end to it all, but decided to give it one more go. I leaned over and touched the sensors. It changed perfectly.

Then the light dawned. The only thing different was the mat in front of the counter. It had been changed that morning, and was one of those rented things that are changed every two weeks. They are damp when laid, being

impregnated with all sorts of odd chemicals to absorb the dirt etc. from customer's shoes.

"Wait just a second Mr. Rockbottom. It's the mat you're standing on. It's robbing you of your vital energy. Get off it quick." Mr. Rockbottom leapt off the mat like a scalded cat.

"Has it damaged me?"

"I don't think so. We can soon test you though." So I rolled the mat up and we now stood on the lino tiles which cover the wood floor (just in case you asked).

"Now we can change channels with impunity, you see."

Mr. Rockbottom was torn between a desire to see his set working properly and fear that his vital energy had been sapped, never to return. He plucked up courage and cautiously touched the sensors. They all worked, and his confidence returned.

"Will it work all right when I get it home?"

"Provided your wife hasn't just shampooed the carpet, Mr. Rockbottom."

## *There's a Hole in my Bucket*

The next nightmare came in with the complaint that it was making a noise but precious little else. On test it almost came on, with a sizzle and then a bonk, a sizzle and then bonk again, repeatedly. A meter check showed that the h.t. was building up to about 80V and then collapsing.

My diagnosis was a faulty zener diode on the power board, and proved that my ability to get things wrong every time was still holding. When the power board was removed from the centre section (complete with main electrolytics) my eagle eye spotted what anyone else would have spotted before taking it out: it was damp, as though it had been sprayed.

It had been sprayed, and there was a hole in the centre of the reservoir electrolytic to show who had sprayed it. Normally a hole in the reservoir is enough to set the local populace panicking for the hills. Anyway, changing the electrolytic was no trouble, but getting rid of the electrolyte was another matter.

Lifting the components from the print and cleaning around them took no great effort, but PL17 (multi-way plug) proved more difficult: the nylon spacer had to be lifted and carefully cleaned, as did the socket, since these two items, situated where they are, took the full brunt of the attack.

When all was done the power unit was refitted and functioned well. The same could not be said of the sync however, since the picture rolled and pulled on every change of scene. This had not been reported, but couldn't have been caused by the leaky reservoir since replacement of the TBA920Q (IC401) was necessary to restore order.

## *The Hatchet Man*

The next one to come along seemed straightforward enough at first. The tube had simply lost emission, and flared all over the place as soon as the brightness was advanced to anything like a viewing level. The tube base voltages were all correct, with about 20V on the grids, 120V on the cathodes and 400V on the first anodes.

Since the owner (Bert) was well known to us, we thought we would try reactivating the tube before taking it out. Much to our surprise however the reactivator showed that all three guns were fully up to normal emitting standard without applying boost to the heaters.

"How long has it been like this Bert?" we asked.

"Soon after I hit the glass with an axe."

"Why did you hit it with an axe Bert? Was the programme that bad?"

Bert explained that he'd been playing cowboys and indians with his kids, and had been about to dismember one of them when the head flew off the axe and hit the front of the TV, actually at the bottom right side of the tube, slicing a chunk of glass off. Just what this had done to the tube's vacuum or the shadowmask I'm not quite sure, but most of the electrons leaving the cathodes didn't seem to be reaching the screen.

This posed something of a problem, since the tube now had no exchange value and couldn't be rebuilt. We had a tube in stock however, and it didn't take long to fit.

"There we are Bert. Cover it up next time you play indians."

The next day Bert was back. The screen had gone dark during the evening, and couldn't be brightened. So we checked the tube base voltages, but couldn't fault them because the picture was quite bright and remained so. We left it on test for a few hours and still it couldn't be faulted.

Bert took it home. Bert brought it back. This time the picture was dark and remained so. The cathode voltages were o.k., as were the first anode voltages, but the grids showed a negative voltage instead of the 20V or so positive that they had previously. The negative voltage was due to faulty beam limiter action as a result of R701 (180k  $\Omega$  – see Fig. 1, page 443, June issue) increasing in value to some 5M $\Omega$  or so.

I've a feeling Bert thought we should have attended to this before changing the tube, even though we explained to him that he could previously turn up the brightness but it produced only flaring on a dull picture whereas when the resistor had gone high you couldn't turn the brightness up at all. Oh well.

### **Return of Mr. Charge**

We'd not seen Mr. Charge for some time, so when he turned up the other afternoon we had quite a chat. I wasn't so pleased to see what he had with him though. It was his daughter's GEC. Funny how you can go off people ever so quickly. We didn't let it show however, and as it turned out it wasn't so bad.

"She let her nibbo tip a cup of something in the back. We let it dry out, but clouds of white smoke come out of it when you turn it on."

This turned out to be something of an exaggeration, but there was a wisp of smoke from the right side. After a tussle we removed the right side line output panel, and found signs of burning around the interconnecting plug and the socket on the front edge. Once again we had to lift the nylon spacer and carefully clean the panel. Cut away the affected bit of the panel and nylon and it seemed ready for use again.

While we had the panel out it seemed prudent to check for shorts. We found one from the emitter of the line output transistor to chassis, so without hesitation we clipped one end of the 47V zener diode D51 which is in series with the BU108. D51 didn't read short-circuit of course, and the original short was still present. After a little swearing it proved to be the 24V rectifier D601 (BYX70) that was responsible.

Upon reassembly everything seemed to work all right and I thought Mr. Charge would be on his way again.

"I'll put this one in the boot" he said, "and get the other one out of the back of the car."

"What other one?" I asked. It was late and I felt a bit jaded.

"Our own main set. I think the tube's at fault – it goes out of focus about every ten minutes or so."

Not another GEC, please not another one!

It turned out to be a Thorn 3500, so at least it would be a change. Switching on revealed that the grey scale was a mile out, with practically no blue. This proved to be nothing more than slight leakage through the first anode switch, and we soon had a normal picture except for some slight misconvergence. It was while I was attending to this that the focus went out and quickly reverted again. All I really saw was the screen becoming a blur, then before I could say cut off my tools and call me Mabel it was back again.

"There you are" said Mr. Charge, "what more do you want?"

I grinned back weakly at his grinning face.

So I changed the tripler and it did it again five minutes later. I changed the focus unit and it did it four minutes after. I left meters connected all over the place, and all I saw was a slight flick of the first anode voltages when the fault next tried to occur but didn't. Why didn't it? Because the meters were doing something.

So I changed R790 (1.2M $\Omega$ , in series with the first anode controls, on the earthy side) on the convergence panel, for no better reason than the flick on the meters, backed by the thought that perhaps the leakage through the blue gun switch hadn't been continuous – because if it had been continuous the present fault (R790 going intermittently open-circuit) couldn't have had the effect it did since the leak would have taken the place of R790. Be that as it may, the variation was no longer present. We had a similar problem with a 3000 not so long since (it's R727 on the 3000 chassis), didn't we ...?

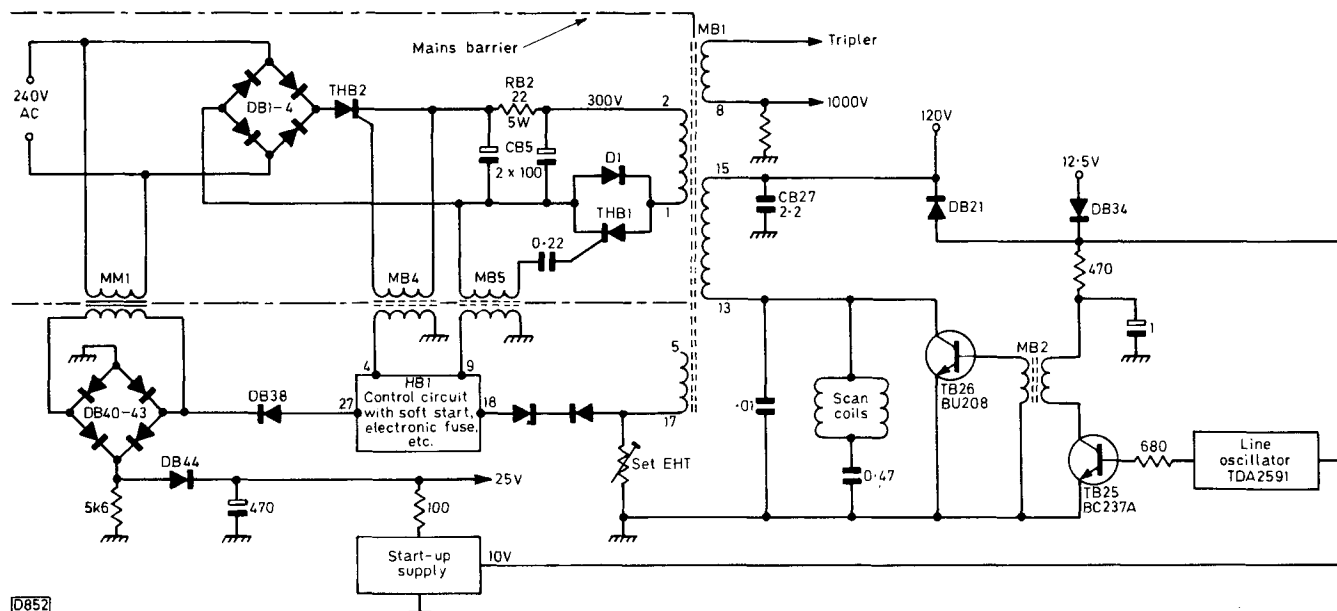
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## **Book Review**

**Television Principles and Practice, by J. S. Zarach and Noel M. Morris, published by The Macmillan Press Ltd., at £12.50 (hardback), £5.95 (paperback).**

There is no doubt that a handy reference book to which you can turn when in doubt about something or when you need to refresh your mind on some perhaps obscure aspect of a subject is a great help. Books that provide a reasonably thorough reference source on domestic TV receiver techniques are none too common, though there have been several good ones over the years. One of the first was Cocking's famed *Television Receiving Equipment*, which ran for some twenty years starting in 1940. There is sadly little it can tell us nowadays, so much has the subject changed over the years. Wharton and Howorth's *Principles of Television Reception* came along to fill the need very usefully in 1967. Geoffrey Hutson's books have been helpful indeed, and now as the latest in the line comes *Television Principles and Practice* by J. S. Zarach and Noel M. Morris (published late last year).

The price is a bit daunting, at £12.50 for some 300 pages (hardback edition), but the production is excellent, with colour diagrams to illustrate convergence and a large number of clearly drawn circuits. We hope it says



*Fig. 3: The Ipsalo arrangement in greater detail, showing the mains barrier system and the start-up feeds.*

The sample pulse for regulation purposes comes from winding 5-17 on the combined power supply/line output transformer. If the amplitude on the sample pulse rises, the switch-on time of the regulator thyristor THB1 is delayed, thus stabilising the width, the e.h.t. voltage and the various d.c. supplies obtained from the transformer.

The drive to THB2 is removed should the voltage on the 20V or 28V rails rise excessively, thus shutting down the receiver's supply. If the over-voltage condition is transient, the circuit starts up again quickly, restoring normal operation. If there's a definite fault condition however THB2 remains cut-off.■

# Suffer Little Children

## *Les Lawry-Johns*

I'm often accused of being hard on old ladies. This isn't true. The reason I seem to come into contact with so many of them is that I'm soft when it comes to charging them a realistic amount for the job. This is fatal, because the word gets around and before you can say Jack the Ripper you have a whole host of elderly female customers and precious little in the bank. It's children that have been giving me a hard time lately however.

I was feeling rather shattered the other afternoon, having left a house where they kept a horse in the same room as the TV . . . Arriving at the vicarage I thought I'd be in for a quiet few minutes at least. No such luck.

The vicar's wife opened the door. "It's the black and white set in the kitchen. It blew up at lunchtime."

In the kitchen stood a good old, reliable 20in. Philips G20T300. "It keeps the children quiet at mealtimes" she said.

I suppose the fact that it was out of action explains why all hell was breaking loose as the two young children fought, with earsplitting screams, to get their hands in my toolbox. The little girl was about two and was the younger. This may have accounted for her ability to scream far louder than her brother who, being a year older, would have been the boss if his sister hadn't been gifted with a tremendous pair of lungs to offset the age difference. I immediately joined battle with the little girl and attempted to wrest the 4BA nutspinner from her. Both of them objected to this, and the screaming assumed 100dB proportions.

During this time their mother calmly stood and explained something to me. I haven't the faintest idea what it was, as all I could see was her mouth opening and closing. In the end I gained control of the nutspinner by giving the little girl my penlight torch. Her brother then wanted it.

I looked round for aid. There wasn't any. The vicar's wife had left me to it and was busy answering the phone. How she could hear anything above the tumult I just don't know.

I removed the set's back cover and put the screws on the table next to it. The little girl grabbed the screws and ran off, hotly pursued by her brother, to where their mother still chatted on the phone despite the screams as the girl tripped over and her brother tumbled on top of her. I decided to take a leaf out of the mother's book and ignored the noise.

The PCL82's cathode decoupler had exploded and deposited its innards all over the place. I presumed that this was due to the usual PCL82 trouble – it runs into grid current, burns out its cathode bias resistor and leaves the decoupling capacitor to take the strain of the high cathode voltage. So I carefully brushed out the area, fitted a new PCL82, and laid underneath the set to unsolder the resistor and capacitor. It was while I was in this vulnerable position that the little angels returned to look at the funny man stretched out under their set.

"Wha dat?" enquired the boy.

"I'm trying to mend your TV set" I confided.

"Wha dat?" he repeated. "When BANG!"

At this the little girl burst out crying and ran screaming to her mother. "Man make telly go bang." By this time I'd

fitted the 470 $\Omega$  resistor and was about to fit the electrolytic when the boy again said "when BANG". So I decided not to fit the capacitor until I'd checked the cathode voltage. I switched the set on and waited for the sound to come through, but the bias resistor started to smoke as the voltage across it soared over the 40V mark.

Scramble out to turn the set off. "Wha dat?" enquired the infant.

"Be quiet" I bullied as panic took over. The type of control grid coupling capacitor fitted in this chassis doesn't leak, so what else? I connected the meter to the control grid and switched on. Nothing till the PCL82 warmed up, then a very slight reading which vanished when I took out the valve. Faulty PCL82?

I just happened to have another, so in it went. The cathode resistor started to smoke again, something it hadn't done when the meter had been connected to the control grid. Wait a minute.

It was difficult to wait a minute, because both kids were now kicking up merry hell quarrelling about who was going to stand on my meter. I snatched up the meter and the tears flowed again. The vicar's wife picked up the little girl and her screams took on a new urgency. She didn't want to lose sight of the meter.

I gave up the battle and brought the set back to the peace and quiet of the shop where only grown ups shout and bawl about. In two minutes I'd found the cause of the trouble – a crack across the track from the control grid to the ferrite bead. This left the control grid floating. Having repaired this and fitted an electrolytic the cathode voltage remained just under 20V. We returned the set to the vicarage. "Wha dat" said the little boy . . .

### **Blue Angel**

I love little girls. Well most of them. Except one that is. She was six years old and sat as quiet as a mouse. Good as gold she was. Sitting there whilst I repaired the Philips G11. It only wanted a new 0.9 $\mu$ F scan-correction capacitor. We always carry these with us and it was no trouble to fit. Before refitting the back cover I leaned over and switched the set on. Not a lot happened so I switched it off and it burst into life. A nice bright picture appeared, with normal sound. I reached for the back cover and the sound faded out. Put the back cover down and prepare to do battle. The sound then came up normal and stayed there. Glance over the top and find the brightness well down. As I looked on it came up brighter and brighter. Then the colour practically faded away to give a black and white picture.

Suddenly I knew it was time to finish with the whole game. It was all too much for a simple soul like me. I walked round to the front of the set and it was then that I saw the red light come on at the top right corner. The penny dropped, and I pointed a finger at the little angel who, to her credit, had sat there the whole time without appearing to move a muscle or even smile.

"You" I said. And she burst out laughing. "Wait till I tell dad. He said you were clever but I knew I could fool you." She had the remote control unit tucked up beside her and had moved only one finger to operate the brightness, colour and sound. It had merged perfectly with her dark blue dress. Horror.

### **Out of the Mouths . . .**

I'd just finished the Pye hybrid set, after spending many hours patiently putting right a seemingly endless number of minor faults, most of which appeared to have resulted from

eager little fingers rather than component failure, when this very small boy came in. He looked at a point about two feet over my head and addressed me.

"Have you done our telly?"

"Which one?"

"This one."

"Yes, I've just finished it. Are you going to take it?"

"My uncle will come for it when the little hand is on the six and the big hand is on the three. Have you done it properly this time?"

"If you didn't fiddle around with it so much it wouldn't need resetting every few months."

"I don't fiddle. My uncle fiddles when we go to bed at night, and when we wake up the telly doesn't work."

"I'll talk to your uncle when he comes for it."

I did, but it didn't do much good because he'd also been up on the roof and moved the aerial around. So when he got the set home he still couldn't get a clear picture. The result of this was that the small boy turned up next morning and looked at my left ear.

"You didn't do our set nicely."

"Yes I did. I did it very nicely."

"You come to our house and do it again because when I woke up this morning it wasn't very nice and my mother is not pleased." Eventually I did go to their house. The aerial was the only one in the road pointing north-west, where there's no transmitter.

### **Fooled Again**

"Our set's gone wrong again" said the woman on the phone. "My husband brought it down to you a couple of months ago and the same thing's happened again. He can't bring it down this time. You'll have to come up." Roughly translated, this meant that the set had gone wrong, they wanted it repaired for nothing and they also wanted a house call for which they didn't want to pay.

For the life of me I couldn't remember a thing about the set. So I called at the house on the way back from another job. The set was a Decca 10 series one (hybrid colour chassis), so I could have done it. But I'd looked through the records for the last few months and couldn't find any mention of a Mr. Twister. I conserved my ammunition however until I'd found out just what was wrong.

The set appeared to be dead except for the tube heaters. This to me meant that the supply was present and there was probably an open-circuit in the heater chain. Checks showed that there was no h.t. either however. As a matter of fact there were no signs of life at all in the set – except at the on/off switch, and those tube heaters.

My mind went blank when I checked again at the mains transformer and found no life there at all. I was about to commit hari-kari when I noticed the heater isolating transformer, fitted so neatly that it escaped attention – so neatly fitted by me some two years earlier. So this was the "recent" repair.

I checked for h.t. shorts and couldn't find any, so I pressed in the thermal cut-out button. The valves then started to warm up. The sound hissed into life, and a nasty fizzing sound came from the right-hand side. I was just in time to see the tripler case arcing to chassis before the thermal trip cut out and the set went dead . . . except for the tube heaters of course.

I'd just finished fitting a new tripler unit when Mr. Twister arrived. I showed him the faulty unit.

"Ah yes, that's what you fitted last time."

"Oh no it bloody wasn't."

I'd rather deal with kids.

# All on a Quiet Afternoon

Les Lawry-Johns

WE'VE been a bit slack lately, and business hasn't been too good either. I'm always a bit suspicious when it's too quiet though. It always seems to herald the approach of a hurricane. This started on the stroke of midday, when Miss Pocock phoned to say that her colour set was changing colour, Miss Fox phoned to say that her black and white set was going grey, and Anna Logg popped in to say that her father's set was all green. "All right" I said to one and all. "I'll call this afternoon and you'll all be o.k. by teatime."

## A Jowett Van

At ten past twelve there was a clattering noise outside and a 1934 Jowett van (two cylinder horizontally opposed engine) pulled on to the forecourt, attracting more attention than our window has for the last ten years.

I helped the owner extract the large Dynatron (still on it's legs) from the rear of the van after he'd unroped it. The castors rolled quite easily on the wood plank floor, and it was soon in the shop where it was found to be suffering from the usual Pye hybrid ailments too mundane to mention.

It was not the set which caused the trouble. It was the little van with its large wire spoked wheels attracting so many people that other vehicles could not get on the forecourt. I hurriedly completed the repair to the Dynatron and back it went into the little square van with its number plate on the top.

Off it clattered, to the disappointment of the crowd which quickly dispersed to allow Derek to bring in his 3500 Ultra, Mr. Deadman to bring in his 24in. monochrome set which needed a new tube, and Geoffrey to bring in his Telpro. I told them all to come back at five o'clock, as the repairs would all be done by teatime.

I was about to start on the first one when a lady came in with a Decca portable (MS1212).

"I want you to tell me how much it will cost and what is wrong before you do it."

So I whipped out the eight screws and lowered the back. When I plugged the set in the screen lit up and there was a faint hum from the speaker. It was a fair bet that the MC1330 detector chip was at fault.

## Talking Chip

"If this thing with eight legs talks to you in foreign languages when you touch it, the voices will be saying that the repair will cost about eight quid give or take a bit allowing for the exchange rate in Tokyo."

"You mean the set will tell us how much the repair will cost?"

"It's the latest thing in silicon chips, but it talks in every language other than English you see."

"Let's see what it says then." I could see she was dubious. So I touched the output pin with the tweezers and the speaker burst into life with various voices as predicted but unfortunately someone was also reading the world news in English, which upset my little game. Just to be sure of the diagnosis I touched the input pin. It was dead, though my claim that it could also estimate its own repair didn't hold water.

"How much then?"

"Eight pounds twenty one including VAT."

## Enter the Audiophiles

So we replaced the chip and started to put the new tube in the monochrome Ferguson set, or rather to take the old tube out. Just as all the bits were cluttering up the bench the audiophiles arrived.

"Have you a lead with a 5-pin plug at one end and four plugs at the other?"

I showed him a 5-pin DIN to 4 phonos.

"No it's not like that. Look, I'll draw it for you."

"Sorry sir, they don't make them with wander plugs on the ends."

"Can you make one up for me?"

"Which pins do you want the plugs to connect to, apart from pin 2?"

"All of them."

"Sorry sir. Try the shop down the road."

The next one to come along put me right off.

"Are you Mr. Littlejohn?"

I knew at once I didn't like him.

"You could say that. What can I do for you?"

"I've this Ferguson Studio 6 music centre. There's nothing wrong with it and it won't take you a jiffy to fix. It's just that the v.h.f. wanders off after about half an hour and there's some distortion on one channel after about two hours. I don't mind paying a couple of quid for your trouble."

"Thirty."

"How much? You must be joking."

"Thirty, and if you like to bring it back this time next month I'll see if I can fit it in."

"\*\*\*\* you. I'll take it somewhere else or do it myself."

And off he went whilst we concentrated on the tube change.

The job completed we then polished off the Telpro which wanted only a new boost reservoir capacitor and a fuse.

The 3500 proved to be more of a headache, requiring a tripler and an e.h.t. transformer. The rippled picture then obtained and the squeaking noise proclaimed that the core had dropped out of L502 during the tussle, suspicion centring upon the cat who had been heard playing with something that rolled. It was finally found under the Telpro. I suddenly remembered Miss Pocock etc. Time was slipping by. Teatime I'd promised.

## Out Amongst the Femmes

Now think. Anna Logg's father had gone green. We'd sold him a new Ultra three years back. An 8800. Probably a shorted green output transistor. Make sure we've some BF337s in the box. Miss Pocock had merely said changing colour. Pye hybrid, probably the CDA panel. Take a spare one just in case. Miss Fox was going grey. Decca monochrome set. Probably the tube, possibly the PFL200, so check to see that we have one.

Off we drove, glad of the chance to get some fresh air. Bowling along with the window down. Who wants to



smoke? Throw cigarette end out of window and wind blows it back in again. Where has it gone? Can't stop here. Pull over when we can. Feel a pleasant warmth on inside of thigh, suddenly becoming an agony. Hole in trousers and blister on thigh. Seat covering singed. Press on, the customers await your expertise.

Miss Fox had left the door open, as she was largely confined to a chair with arthritis (she had arthritis, not the chair). Having exchanged pleasantries we got down to work. Off came the rear cover whilst we waited for the valves to warm up. On came a grey picture, but the raster was bright enough. Not the tube. Note the effect of the contrast control. Working, but it couldn't put much black and white into the picture.

Pull out the PFL200. Didn't seem to want to come out. Eventually it did, but being in two halves the new one went in to stay.

"How's that Miss Fox?"

"There's a nice white line down the middle."

Now if there's one thing these sets suffer from it's dry-joints under the line output stage, leading to the scan coils. What with all the pulling that had been required to remove the PFL200, it was hardly surprising that one (dry-joint) should show up. So out came the main panel and sure enough there was a hole where a lead connection should have been. This done, we put the panel back and refitted the rear clips. The picture was now quite nice, so we put the back on – with all the screws along the top, at the sides and across the bottom.

"Nice and quiet around here Miss Fox."

"Have you turned the volume down then Mr. Johns?"

"No er, I don't think . . ."

Out came all the screws.

"What's that you're saying Mr. Johns?"

"Not a lot Miss Fox."

Naturally when I'd upended the panel to solder the underside I'd pulled off a speaker lead and hadn't noticed it.

"Oh that's better Mr. Johns, I'm so pleased to have it going again. Do I owe you anything?"

"Not a lot Miss Fox."

Rush off to next call, as it was now past four o'clock. Drive straight across crossroads as I was on the main road, only to realise that the vehicle coming from the right wasn't stopping either. Some fool had been up all night painting a roundabout which of course gave the other fellow priority. You just can't rely on anything being the same for two minutes nowadays.

## Changing Colours

Miss Pocock threw the key out of the window as she has arthritis almost as bad as Miss Fox.

"Hallo Miss Pocock, how's the legs today?"

Fancy me asking Laura Lovitt a question like that . . .

"The colour keeps changing. One minute it's a nice colour, then it goes all red."

The CDA panel was the obvious place at which to start. We turned it over, expecting to find some nice cracks that could be bridged with nice bits of wire. There were no cracks, the supply to the red output stage being intact.

Back went the CDA panel. We watched the picture for some time. Then suddenly it went red, in a way which meant that there was a high voltage on the grid of the red gun. This in turn meant that the triode of the PCL84 wasn't passing current. A new PCL84 seemed to restore order, and another simple job was done. Refit back cover and prepare to leave. Screen went red.

Remove rear cover. Check valve base, but all contacts

seemed good. Rocking the valve produced the fault however, so it appeared that there was an intermittent open-circuit inside the base.

I didn't feel inclined to change the valve base at this time of the afternoon, so I fitted the solid-state replacement panel and promised to return with the original the following day.

## A Question of Ethics

Anna Logg's father (I always forget his name but I can't forget hers) lives on the fourth floor of a large block of flats. It's no joke collecting or delivering a set there because of the large number of twin doors – quite apart from the lift. When I arrived Anna let me in. Her father was having one of his bad turns, with his distressing lung condition which makes you feel bad just to look at him fighting for breath. He has oxygen equipment by his chair, and that's all that can be done.

The set was on when I got there, and seemed perfectly alright for a time. Then the screen flashed bright green. I immediately accused the green output transistor at the top of the signals panel of playing about. A meter check showed that the output voltage occasionally dropped to a low figure.

To clear the tube of suspicion I removed the fly lead. The voltage at the signals panel then remained steady, falling only when the tube lead was reconnected. Oh dear. A heater-cathode short in the tube was all we needed. Although the tube was insured for four years, it isn't funny having to implement this. I toyed with the alternatives. Disconnect the heater from earth and tie it to the green cathode instead via a suitable resistor? But if the short still occurs the green will smear across the screen. Fitting an isolating transformer would restore almost normal working, and this is what we do if the tube is not insured. This tube was insured however, and the old boy was entitled to a new one.

"The tube's at fault and will have to be replaced" I told them. "I'll bring over a loan set while we're waiting for the replacement."

"I don't want a loan set. I've never borrowed anything in my life."

Anna looked resigned. "He's like that. He depends on the TV as he can't get out, but he won't accept one which isn't his – even from us. He's a cantankerous old bugger, aren't you dad?"

This was an unexpected snag. Since Thorn take at least a month to replace a faulty tube (counting the transport there and back, which accounts for a few days), the stubborn old chap was going to be lonely for several weeks unless we told a white lie. So we lugged our test gear down to the van, then came back for the set – fortunately having Anna to open the doors for us. Back at the shop we whipped out the tube, and within half an hour it was on its way to Edmonton via UK roadlines (carriage £5.38), albeit in a Mullard box since we didn't have a Thorn one. We then nipped back to the shop and fitted a Thorn New Life tube which we had in stock, and decided to take the set back to him the next day in case he disbelieved that the correct replacement could have been obtained so quickly.

When we took the set back the old chap was very pleased.

"They're very good at implementing their guarantees, aren't they? I think I'll write and thank them."

I charged him a fiver and he said I'd earned that for all the lugging about.

I wonder what would have happened if he'd been one of those clever people who buy their sets from a discount

warehouse? No doubt he would still have found a kindly soul who would have done exactly the same as I had.

Note for Thorn. Isn't it possible to speed things up a bit? Say by having spare tubes at local branches so that they can be dispatched the same day. After all a dealer isn't going to go to all the trouble of taking a tube out and

sending it back if it isn't faulty. And again, we do go to a lot of inconvenience in implementing your set guarantees without recourse to you at all. Do you want a list?

Your good name is being upheld by our unpaid efforts. What about a bit of cooperation in keeping the customers happy?

## Letters

### REBUILT TUBES

In talking about rebuilt tubes (June issue) Les Lawry-Johns comments that he's "probably got it all wrong", which invites replies. May I therefore say that the symptoms Les has been unfortunate enough to experience are typical of tubes that haven't been properly evacuated. Les mentions that at least one of the sources he's tried uses hot pumping. But this isn't the whole secret. In my experience, excellence of the pumping system, combined with high temperature, are the essentials for proper tube evacuation.

Les questions the ageing process. I can say without fear of correction that a cathode properly converted from the metallic carbonates with which it is initially coated becomes a metallic oxide coating which, *in a vacuum*, will remain stable. The oxide coated cathode will change only if there's some other factor at work – and in the tubes he describes this other factor is almost certainly gas present due to inadequate pumping. The measures Les has been obliged to adopt are in fact not reageing but acceleration of the gas absorption by the getter.

There are approximately seventy companies engaged in the business of tube rebuilding in the UK, and I'm sure that the reputable majority of them will agree that Les has been singularly unfortunate. Anyone experiencing the sort of problems that Les describes should return the tube as unsatisfactory and ask for his money back.

*T.W. Smith, C.Eng., M.I.E.R.E.,  
Managing Director,  
Display Electronics,  
96-100 Waterloo Road, Uxbridge Middx.*

### VCR SPEED CONVERSION

G. Beard's article on VCR speed conversion in the July issue was excellent. For those who wish to double the playing time but don't require the machine to be compatible with the N1700 standard however there's a simpler approach. The only part that has to be purchased is an N1700 head drum – the extra servo head, new audio/sync head and centreless grinding of the capstan are not required. This is how I modified my N1500 machine – the job took a couple of hours and was well worth while.

The N1700 head drum was first fitted, giving a tremendous improvement in picture quality and much more positive adjustment of the tracking control (due to the

slanted heads). The motor pulley was then removed, and a gauge was turned up to fit the groove (see Fig. 1). A piece of quarter-inch mild steel was then chucked up, projecting  $\frac{3}{4}$  in. from the chuck, and carefully turned down until the motor pulley was a tight fit (this is essential if it's to run true). The pulley was next clamped on tight and turned down to 0.505 in. (Fig. 2). You'll find that the cone-shaped end of the pulley is just under 0.5 in., which is a useful guide. With alternate use of a 90° V tool and a narrow parting tool made from a hacksaw blade, the groove was turned until the gauge fitted perfectly (see Fig. 3). The pulley was then replaced and all the drives cleaned. No adjustment was necessary, but an 0.1  $\mu$  F capacitor was connected across SK401 3-5 to correct for loss of audio h.f.

The timer was modified as suggested in the October 1978 issue, page 646 (not page 64 as stated). Another way of doing this is to fit a switch above SK12, which closes when the machine laces up, shorting out the timer switch SK6, so that when the latter opens after an hour the tape runs to the end, the auto-stop then operating. For short-period recording, this can be disabled by using the CK switch, which is not used usually, so that the timer's switch off facility is used (see Fig. 4).

So there you are: if you don't want to be able to replay prerecorded tapes or tapes from N1700 machines the modification for double playing time is quite simple.

*Mike Phelan,  
Holmfirth, W. Yorks.*

### VIDEO POLARITY

Other readers may be interested in the problem that confronted us recently and the way in which we managed to resolve it. The set, a "Continental Edison" monochrome receiver, was brought to us with the complaint that "it wasn't working". The symptoms however were a negative picture and loss of both line and field sync, with normal sound.

After some investigation, we found that the set was intended for use with positive instead of negative vision modulation. The video channel consists (see Fig. 5) of a detector diode followed by a couple of emitter-followers and then the output transistor. The second emitter-follower provides two outputs, one to the output stage and the other, from its collector, to the sync circuit. Our first thought was simply to reverse the detector diode, but this was not successful as the video signal's d.c. component cut off the first transistor. Our second approach to the problem, transposing the video and sync outputs from the second stage, was more successful. This produced a normal, positive picture, but the sync locking was still unstable. We tried to improve the sync by taking the sync feed from the output stage instead of the second stage, but while this improved the sync locking it made the picture worse – the distorted frequency response produced smeary vision.

We finally decided to try to get the signal polarity right by modifying the first video stage – by taking the output from the collector instead of the emitter of the first transistor (see Fig. 6). This was most successful, and gave a better quality picture than some comparable, unmodified

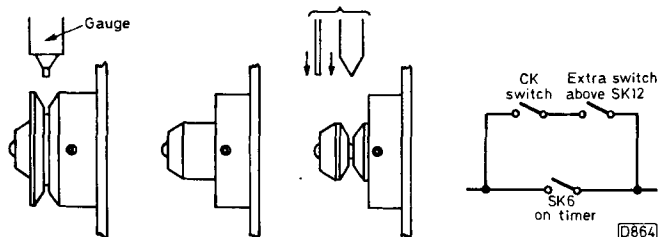


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

# Ben's Waterloo

*Les Lawry-Johns*

I HAVE to record an event which no doubt has a moral to it. I don't know what the moral is mind you, but it must have one somewhere.

As you probably know, we have a dog named Ben, who is a rough coated collie. Some of the kids who do not know us well call him Lassie, but Ben is not too keen on this.

Again, as you probably know, we have a cat named Spock, who is of dubious parentage but somewhere way back a Siamese must have had a hand in it because although she looks a typical tabby her paws seem to be more cushioned than most and she never seems to stop talking. If no one else is around she will talk to Ben, and use his extremely long nose as a rubbing post to give herself the comfort she seems to regard as her right at all times.

Now Ben has had an upset stomach for some time, so I suppose he wasn't feeling too good. Anyway after putting up with all this purring and rubbing at his expense he suddenly snapped at Spock who gave a yell and vanished from sight. I witnessed this almost unprovoked assault and lost my temper with Ben. I threw the front door open and threw Ben out on to the street. "Go and don't return" I bawled. Ben slunk away, and I slammed the door and locked it – it being early evening and the business of the day over.

"What was all that about?" asked honey bunch, making a belated appearance on the scene.

"Ben attacked Spock. She's gone and so is he. I will not tolerate violence . . . er, in animals that is."

She immediately opened the door of course and looked up and down for Ben who was nowhere to be seen. By this time I was feeling sorry for what I had done and a bit ashamed. So we got the car out and went in search. We sought him here, we sought him there, up hill and down dale, only pausing to take brief refreshment from time to time. At last, footsore and weary, we made tracks for home. At 11pm, as we slowed at the final corner, the local pub called the Waterloo was turning out. And there, coming out of the saloon bar and exchanging goodnights with the regulars, was Ben. We stopped and opened the rear door for Ben to jump in, as though we were a taxi he'd ordered. When Ben entered the shop, Spock rubbed her nose round his face. Peace was restored.

## **The Heavy Portable**

A couple of years (or so) back we sold a small portable to a middle aged couple. It was a Marconi Model 4816 (Thorn 1590 chassis), so it weighed only a few pounds. The other day the husband popped in to say that it had gone wrong and would I call to fix it. I suggested he brought it in, but he said that as they hadn't a car it would be far too heavy to carry.

So I called at their house and inspected the set, which had blown its l.t. fuse. There was some discolouration around the sound output stage, and the wiper of the small preset that sets the output stage bias was missing. I asked if the set had been dropped? "Well not exactly, my brother-in-law caught his foot in the mains lead and pulled it off the table."

I didn't have with me the transistors required or the preset, so I picked the set up and was about to depart when

his wife returned from the town carrying the shopping. A very small slight woman, she was carrying two enormous bags that were crammed full. They must have weighed at least twice as much as the portable. "I normally go shopping with her to carry the bags, but as you were coming I stayed in" he explained.

Incidentally, if you have a battle with the audio output transistors and are not sure of the setting of the bias preset (R70, sets with silicon audio transistors), turn it anticlockwise to drive the associated bias transistor (VT27) fully on, thus decreasing the resistance between the bases of the two output transistors – or hook a fixed resistor of 22Ω between the bases until the bias transistor has been sorted out. The fixed resistor may save another pair of output transistors if there's something wrong with the preset or the bias transistor.

## **The French Connection**

Having picked up the portable, I had to make another visit in response to a phone call I had had from a female with a delicious French accent. "My television he has gone." So we arrived at the house and the accent proved to be matched by its owner. Long dark hair, dancing blue eyes and a figure that a man he could enjoy.

"You have come to bring my television back, no? I am so lonely without it. My husband he is away on the North Sea looking after Scottish fishermen as none of them can swim, no?"

I didn't quite understand this, but who was I to argue?

The set was a Decca Bradford (30 series) with the PL509 line output valve running red hot. I thought you'd rather hear about the set than the French lady, no?

There was at least 40V negative drive at the PL509's control grid, so the oscillator was clearly o.k. We next unhooked the tripler but the overheating continued apace. The capacitors proved to be innocent, but the transformer was warm to touch.

"Come and feel this" I invited her, and she did. "Ooh La La, it is a hot one is it not?" "You need a new one. This one is worn out" I told her convincingly. "You can put one in for me, yes?"

As it happened I was able to do so. For once I was carrying a Bradford line output transformer.

## **Troubles with a Deccola**

There was only one outside call the next day – to see a set that was far too heavy to move unless it was really necessary. Again it was a Decca, but this time an audio suite about the size of a large sideboard – with a bow front.

Some years ago I'd replaced the original Garrard idler-wheel playing deck with a belt driven unit to bring it up to date, but I'd kept the amplifiers etc. just as they were – the response was really good and a joy to listen to. And so it should have been with its four EL34 output valves and fourteen loudspeakers (two woofers and the rest small units in rows at either side to get the maximum distribution).

The complaint was that radio was low on one channel but normal on the other, whilst on records there was



# Quatermass and the Navy

*Les Lawry-Johns*

It all started reasonably enough. "Have you a large cardboard box?" asked the young lady who was moving. Moving house that is.

So I toddled off downstairs to the basement, which is used only for storage purposes. You know what basement areas used for keeping odd things in look like. A bit of a jumble with only a narrow track for the chappie to get to and read the meters.

Somewhere over in a little used section was a large empty cardboard box, among many others that were filled with this that and the other. I made my way over to the box, and noticed a certain give in the floorboards. This became more alarming as I reached the box.

I attempted to lift the box, and was surprised to find it stuck fast. "We have ways of making you move" I snarled. My mighty muscles heaved, and up came the box complete with a large section of the floor. I stood there and stared stupidly at the hole in the floor. It was not a black hole. It was a white one. Hideous white fungus was everywhere. It had come through the floor boards and had been busily engaged in eating the box when I had surprised it. I remembered the girl waiting above. Should I invite her down? Better not.

I managed to find a box in the next basement room, and hurried up so that I could bid her farewell and hurry down again. I was then able to take a more objective look at the situation. So I peered, and whilst doing so realised that the world was relying upon me (though it was blissfully ignorant of the fact) to take decisive action to put an end to this menace that had started down in my cellar. I thought I could see the mass moving toward me, angry that I had robbed it of the box. I circled the hole warily. It suddenly made its move, and my foot went through the floorboards.

"Help" I screamed. "It's got me."

Honey bunch came to the top of the stairs.

"What are you on about now?"

"This plant from another world. It's grabbed my foot and I've got only one left."

It was a relief to hear her clattering down the stairs to my rescue. "Pull your foot up you idiot" was her helpful suggestion. So I pulled up my foot and another large area of the floor came up with it. "We can't fight it" I told her. "Better by far to burn the whole place down than to let it spread."

"Let what spread?"

"This evil fungus that grows larger by the second."

It's only cellar fungus. You always get it where there's dampness and no proper damp course. It's because we're on the side of a hill and the sand and gravel . . ."

I cut her short. "That's right. Ruin the only chance I'll ever have of being a hero. If that's only cellar fungus, how come it whipped the floor away from under my feet and left me only one?"

"Because there's wood worm everywhere, and what with that and the fungus this whole place will have to be cleared. It's even older than you are and either can be expected to fall to pieces at any moment."

I stood there in stunned silence. So this was my reward

for all I'd done. I'd even sorted out a Christmas card for her from last year's box.

At that moment someone came into the shop carrying something heavy.

"You start moving the stuff into the next room. I'll be down to help you as soon as I can" I told her.

## *A Green Screen*

The heavy object turned out to be an ITT colour set with the complaint that the picture – what there was of it – was green.

"Call back at five o'clock, I'll have it done by then" I promised. So off he went, leaving me with the set which had a bow front and a single sliding door. Vaguely familiar, but not the CVC5 I'd expected. As I took the back off I realised it was a CVC2, with three PCL84 valves for the colour-difference output stages.

I immediately made the first mistake. Instead of studying the displayed over bright, green screen to note that the field scan was shrunk and rolling like mad (which I assumed to be maladjustment), I started to take voltage readings on the PCL84 valve bases (with the set upended and the bottom cover off). The readings were queer, with negative voltages at the blue and red triode anodes while the green one was positive.

New PCL84 valves didn't help. Disconnecting the tube leads didn't help. All the resistors read right, and the capacitors were in order. Time slipped by, with the noises from below getting louder. Clearly honey bunch was getting agitated, moving things from one room to the other including colour tubes and old chassis which would have come in handy fifteen years ago. She was muttering something as she puffed and huffed, but nobody can accuse me of being an idle layabout.

"I'll be down just as soon as I get this set out of the way" I called, to give her heart. I could do the job in half the time but I can't be in two places at once.

I tried to get back to thinking straight about the CVC2. The three triodes act as identical clamps, and if all the circuitry checked out correctly how come the voltages were different? The penny dropped as I reached once again for an electrolytic to decouple the supply line. Sure enough, the voltages evened up and the grey scale was restored, as was the full scan.

I looked at the circuit diagram to identify the faulty electrolytic and found that the supply to the PCL84s comes straight from the main 700  $\mu$ F h.t. smoothing capacitor. This is in the very large can along with the 300  $\mu$ F reservoir capacitor. It was replaced in no time while I kicked myself for repeating the mistake I'd made quite recently with a Pye hybrid colour set. Will I never learn? The h.t. ripple gets rectified by the clamps you see. Or something like that.

Having restored the grey scale and set it up for nice viewing, noting that as ever on these sets the tube was as good as new, I then turned the colour up and found that it was already at maximum. Adjusting the tuning showed up the subcarrier dot pattern, so the tuning was near enough and we turned to the vertical left side decoder panel, which like the rest of the set is hand wired. I'd no sooner settled down to check the burst gate etc. than the colour flooded back, only to go again as the panel was touched. After some jiggery pokery the contacts on the bottom plug and socket were found to be quite loose, harmony being restored when they were tightened.

Which is more than I can say when honey pot came up from the cellar. I thought it was Al Jolson, about to sing Mammy. She didn't sing that.

"I've cleared that whole room without one bit of help from you and all that junk is going over the tip whether you like it or not."

"I'd better nip down to see that you've done it properly sweetheart."

She'd cleared it quite well really, for a woman that is, and now the full extent of the disaster was revealed. I was no longer afraid of the fungus. Just a bit of cellar fungus plus a spot of wood worm I thought. I'll see how far it's gone.

So I lifted the nearest floorboard to the hole and it came up quite easily. So easily that it pulled up the skirting board eight feet away and this caused the plaster wall to bow out and collapse in a cloud of dust on to what was left of the floor which gave way to leave me face down in the fungus.

At this moment honey bunch called down the stairs. "You're wanted in the shop. Hurry up."

I picked myself up, brushed myself down, and started up the stairs.

"What on earth have you been doing to my nice clear room. You look terrible, and what was all that noise?"

"The wall's collapsed on me and the rest of the floor gave way. We'd better declare this a disaster area."

"You're the disaster. Now help this gentleman, he's been waiting to see you."

The gentleman had a dark blue Philips 550 field service manual in his hand and immediately launched into his tale of woe.

"I always keep my set in good order myself, but there's something that's eluding me this time . . ." And he went on and on about the steps that he had taken over the past two weeks. *Two weeks!*

I began to get impatient as he related how he had changed the BT106 thyristor and both BC147 transistors on the power panel despite the fact that he had about 200V on the h.t. supply fuses. So I turned the pages of his manual to the line output stage section and stubbed a dirty finger at the 800mA fuse. "Have you got 200V there, at both ends of this fuse?"

"Yes I think so. I can remember you telling me about a year ago to check here and at both ends of the 47  $\Omega$  resistor over at the front end, so I'm sure it's there all right."

"If it's there, why bugger about with the power panel?"

"Well, I thought the waveform might be distorted by the trigger pulse circuit."

My cool was rapidly deserting me. Here was I at the cross roads of my life, with my world tumbling around me, and all this fool could think of was his trigger pulses. I made a last attempt at sanity.

"See that 10k  $\Omega$  wirewound, start-up supply resistor on the timebase panel just there. Check that you've h.t. at one end and 18V at the other. If the 18V is absent, check the resistor by putting your finger on it. If it burns you it's all right, if it's cold it's not. If it's hot check for shorts. If the voltage is low check for leaks, here, here and there."

So off he went to check his voltages.

My friend surveyed the stricken cellar room.

"All this plaster has got to come off the walls. We've got to get down to brick. Every bit of wood has got to go, so we'd better start moving it." So we started.

## No Sound

I had to go up because someone wanted me, and as I didn't like the idea of him heaving all that heavy stuff up the stairs and out the back I asked honey bunch to give him a hand. Up and down they huffed and puffed with loads of rotting wood and buckets of plaster and brick until there was a huge load near the back gate. Whilst I got on with

the difficult job of finding what had happened to the sound on a Körting.

It was a hybrid of the 52665 variety, with a solid-state audio circuit. The speaker is fed from a small, separate panel on the top left side. This is coupled to the audio panel further in. The speaker clicked nicely when checked at the plug and socket on the small panel, so we turned our attention to the output transistors. The voltages were there and were all correct, so we injected a signal at the input and received nothing. We injected a signal at the output and received nothing. We went back to the small panel and injected a signal at one end of the 470  $\mu$ F output coupling capacitor. Nothing. We injected a signal at the speaker side of the capacitor, sound loud and clear. We fitted a new capacitor and the sound was restored.

I then turned to see how they were getting on with their clearing up job. They'd cleared up the wood and rubble very well, and it was all out the back together with all my precious old chassis and spare bits and pieces which would have come in handy some day. Even my 1938 service manuals had been crammed into boxes and taken out, the HMVs, Marconiphones, Ekcos and Cossors. All consigned to the rubbish tip.

The next job was to get someone to take the lot away. I contacted the local contractor who said he would call late in the afternoon. When he came he was on his own as he was sort of doing me a favour and it wouldn't cost me very much.

He backed the lorry up to the rear gate, and we found that we would have to shovel all the plaster and stuff into a dustbin and then tip the dustbin into the lorry. The rest of the stuff could be carried the few feet.

As we were about to start, a set came in which needed urgent repair. So I nipped into the shop to see what it was all about and told honey bunny that the man out the back needed a hand but if she could do the repair I would go back out. This is how she became a navvy for half an hour or so.

The chap with the lorry said she was much better than the average workman he had with him during the day, and I said I didn't mind her working so hard if it helped him. So to the sound of much shovelling and heaving about (I had said they might as well shift all the old sets out in the shed while they were about it) I set about doing the urgent repair.

## Line Output Transistor Trouble

With all this going on I wasn't thinking too well when I tackled the 8500. It didn't take long to find that the excess current being drawn was due to the line output transistor being short-circuit. I fitted a new BDX32 and checked around for any other shorts. Finding none I switched on. There was a funny buzz and the cut-out cut out. The new line output transistor was short-circuit.

It then dawned on me that I hadn't disconnected the e.h.t. rectifier, which is the easiest thing in the world to do since you just pull the plug out of the overwinding. It occurred to me that I'd done this sort of thing before. If only I'd the patience to insert a nice wirewound resistor in the h.t. feed to the line output stage like I tell everyone else to do I might have saved a few bob and quite a bit of aggravation. So we had to fit another BDX32 and then change the e.h.t. unit in order to restore normal working.

Talking about normal working, when I went out the back to see how the work was progressing I found it was all clear. Honey pot looked just like a red Indian. All red she was, and sort of puffing. She even forgot my name. Potter she called me.



for use with sets featuring remote control – it's worth testing the batteries in the transmitter unit before getting involved in fault-finding in the remote-control circuitry.

So much for tools. What about components? Contrary to the belief in some quarters, the valve is very much alive so far as the field service engineer is concerned – a fact that Philips seem to have overlooked in their latest toolcase. I bought one of their cases some years ago. It had special plastic clips to hold valves and was an excellent case, though after several years of heavy use the outer case fell apart. So I bought an executive briefcase made by Custom – they do a deep one, 19 × 14 × 16in., which is ideal – and glued the valve clips in the lid (see photo). The folder provided is useful for circuits, and the little pockets intended for pens can be used for trimmers, tweezers, etc. It's obviously not feasible to carry a full set of manuals, but the

circuits for the popular chassis you're likely to meet should fit in the folder.

At the rear of the case I've made a small compartment about 2½in. wide and the full width of the case. This takes all the small tools. In front of this I have four Raaco plastic boxes (10½ × 6 × 1½in.) for components. These can be stacked two high. It's prudent to have a stout rubber band round each. There's still room for the multimeters I carry, the soldering iron and gun and one or two other items. A piece of plastic foam about ¾in. thick covers the lower compartment and doubles as a kneeling mat. As mentioned before, don't overstock with components. Throw the used ones in a box, and replenish daily.

In addition to making life a lot easier, the toolcase impresses the customer, giving him confidence in your technical ability. ■

# The Exorcism of Fred

Les Lawry-Johns

WHEN I heard all the shouting and cursing coming from the bathroom I had an uneasy feeling that something was wrong. Only that morning the gas fitter had been to repair the multipoint so that honey bunch could have her bath and splash around happily. Now it seemed that she wasn't splashing around, and it appeared that a bath was out of the question as the gas was again not flowing. It was all my fault of course.

I did my best. I took an electric kettle up and plugged it in for her so that she could splash around in the sink, but she still wasn't happy. So the next day I phoned the gas board and told them that as far as gas goes, it had gone again.

Another and much nicer chap came and said that the faulty unit couldn't be repaired and that he would bring a new one as soon as possible. The next day brought two messages from the gas board: one was a bill for the repair of the old unit, the other was a note to say that a new unit would be fitted in two days' time.

Smack on time the new unit arrived, and was fitted by the fitter who had brought his stereo cassette deck with him to be repaired. Apparently, all the time it was playing there was an intermittent crack from one speaker, accompanied by a distinct jump on the right-hand VU meter. The left did not appear to be affected.

It was a Marantz 1820 Mk II. Quite a nice job if you understand these things, but normally I'm a little shy and confess to a total ignorance of them. If he was good enough to get my honey bunny into hot water however, I was going to sort this thing out however much I suffered. And suffer I did.

Off screws, off cover. Identify the right-hand and left-hand amplifiers and concentrate on the right-hand one. Without a cassette in, but with the thing playing away like mad, there shouldn't have been much noise in the headphones nor any movement of the meters. Every now and again however there was this distinct click in the right-hand headphone and a small jump on the meter.

So I shorted the base and emitter of what appeared to be the final amplifier and the noise vanished. Good, we're making progress. Ignore the fact that a slight click could now be heard in the left-hand headphone, about every fifteen seconds.

Proceed down the right-hand channel to the input, shorting the base to emitter of each transistor in turn, and at

no point did the click reappear on that side. It reappeared only when the amplifier was left working normally – and then far louder on the right-hand side. So we listened for the background hiss, and this too was louder on the right-hand side. When the two sides were equalised, the clicks sounded the same and both meters responded to them. I sat there encased in my headphones and pondered.

The regularity of the clicks suggested that the cause was nothing irregular. Therefore it was something building up a static charge due to regular movement.

"You're the only moving thing" I said to the cassette motor, prodding it with my meter and leaving it there. What a masterstroke! What genius resides here! Removing the prod and allowing fifteen seconds on my dad's old watch brought back the clicks. The cassette motor is cushioned on rubber grommets, and has no bond to earth. It has now. The gas man was awfully pleased. Then I gave him the bill.

## Enter Mr. Slaughter

Mr. Slaughter's a jolly fellow. Must be something to do with his living. I don't mean the *fact* that he's living, I mean what he does for a living. He's a butcher of course. What a way to get rid of your inhibitions! Chop up a leg here or there. Nice piece of breast madam? – certainly. Slice, slice. Anyway, I helped Mr. Slaughter in with his Bush CTV1122 (Rank A823A chassis). "Picture's sort of faded. As though the entrails have been taken out, ha, ha." "O.K. Mr. Slaughter, call back this afternoon. I may have managed to stuff them back by then."

When Mr. Slaughter had departed I was alone again. As all geniuses who can earth the casing of a Marantz cassette motor must be. I would again try my diagnostic ability.

The picture certainly lacked entrails – we don't say guts in this magazine, we leave that sort of thing to *Wireless World*. Plenty of foreground but no background. Our diagnosis was immediate. Faulty SL901 demodulator/matrixing chip. Just to be sure, I clipped in the test panel. Lovely picture. "When the chips are down, you know who the men are" I muttered. With two deft sweeps of the desoldering braid the SL901 was free. Pop in the new one and Bob's your auntie.

In went the new chip and back went the panel, not forgetting to put the black plug back in the power unit.



When I switched on I noticed a flash from the surge-limiting thermistor, and resolved to change it before completing the job.

The picture was still the same and all my cheer departed. The sound was o.k. and the colour was there, so I made another guess. The luminance emitter-follower transistor – where was it? I grabbed the circuit and took off my glasses so that I could see it. There it was, 3VT3 (BC148). Coupled to the luminance delay line via that electrolytic ... that electrolytic (3C43). Then I remembered. I always do when I've wasted quite a bit of time.

The capacitor is of the type (you know the ones) that when frightened by the meter reads about 500k $\Omega$  and steady. The circuit said 6.5 $\mu$ F, the faulty one was 10 $\mu$ F, so I put in an 8 $\mu$ F type because one was looking at me out of the box. In it went (round the right way for a change) and harmony was restored – until I switched on and the surge-limiting thermistor flashed and fell to bits. Why didn't I change it the first time I noticed?

### **The Card Game**

We labour for six days without complaint. Almost without complaint. On Sunday morning we tidy up a bit, sort out the books etc., and at twelve o'clock get ready for the big event of the week. At one o'clock the card game starts at "The Call Girl" which, if you remember, is a pub in Harper St. where Ernie presides over the taking of our hard earned cash.

All week long honey bunch and I are on the best of terms. Most of the time. But at one o'clock on Sundays we are bitter enemies, no quarter asked or given. She's Sean's partner, and I have either Mick or Dick depending upon who's helping Ernie behind the bar.

The game is whist, and therefore partners are not always on the best of terms, or let's say don't always see eye to eye, though I must say that honey bunch and Sean rarely fall out and are most polite to each other. This is in distinct contrast to my partner and I, who scream and shout abuse at each other at the slightest suggestion of one trumping the other's trick. Despite this we are usually handomely in the lead after a hard fought battle, and honey bunch has many theories as to why this should be, none of which holds water as far as I'm concerned.

If there's one topic I hate during all this it's TV sets, and if anyone broaches the subject to me at Sunday lunch time they usually get short shrift. When Sean was dealing this week however (he deals hearts as trumps) he started telling me about his TV set that had gone wrong the previous day. I didn't hear a word of it because I've got a lot of wax in the ear nearest to him. The fact that I didn't hear what he said upset honey bunch who immediately accused me of not taking any notice of what Sean was saying.

"I can't hear through this ear" I explained. I'd just about got the gist of it however. ITV keeps dropping out, but the other two channels are fine. "The grease in the tuner unit wants cleaning out" I said. This seemed to me a perfectly valid explanation, since the set was a Thorn 1500. Sean muttered something like the grease in his tuner being about as troublesome as the wax in my ear.

But we got back to playing cards, and Dick and I won the hand by two tricks. It was then Dick's turn to deal and he deals clubs. "My set's playing about as well. Keeps going green it does." His set was a Thorn 9000, which we'd sold him some four years earlier. I was busy collecting all my trumps and putting them in order when Sean stirred it up.

"He doesn't hear out of that there, but I can tell you what's wrong. You've got wax in your tuner unit."

I shot Sean a baleful look. "He hasn't got grease in his tuner, but you have and when I clean it out tomorrow the ITV will be as good as the other two, however daft that seems, and what's more I doubt whether you'll get one trick in this hand."

That concentrated everyone's attention on their cards wonderfully. Honey bunch whispered "I bet he's got a handfull of trumps."

"Too true I have" I sneered, and then realised that I'd heard her whisper very well. "I haven't any wax in this ear, so there."

### **A Ghost Story**

I suppose that at this time of the year a ghost story's in order. This one I've known about for some time, so it's not a tale that someone has just made up. Maybe there's an explanation, but I can't see it.

Our local newsagent and his wife and family live in a house at the top of the road, adjacent to an old church that was pulled down some years ago, the site being grassed over and preserved. Some years ago they realised that some peculiar things were happening, like rings vanishing from the dressing table in the bedroom and appearing on top of the TV set. Silly things, but irritating when you put a thing down in one place and then find it somewhere else. Hardly a ghost however. Then one day on arriving home in the evening they found a quaint looking old man in a funny hat sitting in a chair in the lounge. When they came in he got up and walked through the wall (the people next door also see him passing through apparently). He didn't seem to harm anyone, so they accepted him as an occasional visitor and called him Fred.

They saw a lot of him after that, coming and going at odd times, and he seemed to have a liking for that particular chair. Their teenage daughter was not so keen however, since she swears that he laid on her bed one night and wouldn't get off for some considerable time, during which she was unable to move. They also have two sons who were well acquainted with Fred, and a black and white spaniel by the name of Toby who was scared stiff of him. On one occasion when Fred appeared and walked toward Toby, the poor dog became almost hysterical and backed up the stairs with every hair on his body standing on end. In short therefore everyone in the house had seen him.

When I heard about all this I was convinced that one of the younger members of the family was responsible for the manifestation, as young people often are without being aware of this peculiar ability. As they get older they seem to lose the ability, and many a good ghost has gone west merely because the children have grown up. In this case however the children were not particularly young, and the one most affected by Fred appeared to be the dog.

As I say all this was well established and caused little concern. Some time later however the family acquired another dog, this time a golden spaniel by the name of Copper. Now Copper is one of the most extraverted and joyous dogs I've ever known. Always chasing around and barking for the sheer fun of it.

Copper hadn't met Fred who popped in only from time to time. One evening however Fred appeared in the lounge just as Copper came hurtling through the front door and into the lounge. Copper saw Fred and made straight for him. Fred took one look at the barking dog and promptly vanished. He hasn't been seen since. Or so I'm told.

So now you know what to do if you want to exorcise a ghost. Any ideas about the different effects on the two dogs?

# I Wish I Had Your Job

Les Lawry-Johns

YOU'VE noticed of course that once one horrific, heartbreaking job has been cleared up another immediately follows. Then, as though Satan himself was directing things, yet another comes along. That's how it's been recently.

"These things are sent to try us" said honey bunch consolingly.

"Try us indeed. What you mean is try me. It's me that's being tried and found wanting, and the chances are that someone up there doesn't like me and never will. I'm fed up with it all. Mix me an overdose and let me be free."

"How you do go on. Just because you're mucking up one job after another we all have to suffer. Now if you'd taken that panel out properly instead of wrenching it out like a maniac it wouldn't be cracked right across."

## Fluctuating Picture

So saying she wandered off and left me trying to think up a suitably cutting reply, something I found difficult since I was still trying to work out why the picture on this Bush Model CTV1122 (A823A chassis), which had come in to have a new tripler fitted, was fluctuating so wildly. They had mentioned that the picture occasionally "jumped on changes of scene", and I'd said it was only a small thing that wouldn't take a minute once the new tripler was in...

I examined the picture carefully. On a bright scene, or when the contrast was advanced, some lines appeared horizontally, the picture fluctuated wildly in size, and there was evidence of a hum bar. A meter across the h.t. line showed a corresponding voltage fluctuation before the picture quickly settled down. I pointed an accusing finger at the thyristor, but noticed that it was new - as was the trigger diac. To be sure, I fitted a known good spare panel, but there was no difference.

With the hum bar in mind, I turned my attention to the h.t. smoothing and reservoir capacitors. Both had small bubbles at the end, so out they came. At the same time I noticed that there was some corrosion at the tags of the centre l.t. smoothing capacitor, and one tag fell off when it was touched. So out it came and we ended up with a shining new set of electrolytics. No difference, except that the hum bar, which hadn't been very evident anyway, now wasn't evident at all. But the picture still showed lines and fluctuated from time to time, particularly when the contrast was advanced.

Since the field scan seemed to be affected most, I replaced the right-hand side timebase panel - without much hope of success. It must be the new tripler then. It wasn't. Neither was it anything to do with the line output stage nor the convergence panel. I examined my head carefully in the mirror. Definitely greyer, and there was this kind of glazed look...

It must be a poor earth return. The term has a likely ring to it. Crocodile clips and leads all over the place, and whilst wasting all this time I noticed that a new tube had been fitted recently. This was the last place left to check. It just had to be here.

All the earthing connections seemed to be loose, as

though whoever had fitted the tube had been so exhausted by the effort of securing it that they hadn't the strength to finish off the job. The thick sleeved strap really seemed to be the one that was slopping about, and when this and the other contacts were tightened we couldn't make the fault reappear. We still can't quite see how this could have been responsible for such a drastic h.t. voltage variation.

"Did you find out what was giving you so much trouble?"

"There was a screw loose."

"Quite common around here."

No wonder I hate women.

## All that Glistens...

A familiar car drew up outside. It had drawn up only yesterday. The nice man with the 26in. Philips G8. We fitted a nice new line output transformer for him, and he'd paid in nice new fivers.

The 800mA fuse on the line timebase panel had failed again however. There were no shorts, and the output transistors appeared to be in order, but when we connected the meter across the fuseholder and switched on we got a reading of well over 1A, while the 47 $\Omega$  anti-breathing resistor in the h.t. feed to the line output stage started to overheat. Pop went the fuse on the power supply panel.

Once more my hawk like eyes narrowed. Once more I couldn't see a bloody thing. But I was called upon to make a decision. The glistening new transformer was unsoldered and removed. A dull brown FAT 035 G8 replacement was fitted. The tripler was left disconnected, a new fuse was fitted over on the power supply panel, and the meter was linked across the fuseholder on the line scan panel. Switch on and a reading of some 400mA showed that the right decision had been made, difficult though it had been. Connect the tripler and the reading rose to about 500mA.

"Sorry sir, very sorry. Your new transformer had rather a short life."

"I hope this one fares a bit better."

"It will sir, and a happy new year. Mine's started off interestingly enough."

How fortunate that we keep a good stock of G8 line output transformers.

How prudent that we keep a good stock of... if there's a competitor, it must be the Rank T20 chassis. Having said that however I must add that I find the G8 the easiest set to work on. It's caused me few real problems.

## Which Reminds Me

One that raised my eyebrows came in the other day however. It came in because the picture was over large, and because the customer was fed up with the service he'd been getting from a nation-wide group. The over large picture was due to low e.h.t., one of the line output transistors being short-circuit. We also found that the h.t. was 240V instead of 205V. Having replaced the short-circuit transistor, we wound the h.t. preset down and checked again. Still 240V. So we checked the preset in the over-voltage protection



reached from below, so the set had to go off again. Release and slide out panel, then upend it. The 47/48V supply circuit is shown in Fig. 2, and what we discovered was that the 470  $\mu$ F reservoir capacitor C861 was loose in its solder while the filter resistor R857 (6.8  $\Omega$ ) was dry-jointed. The dry-joint on R857 would explain the field collapse of course, but would the loose reservoir capacitor explain the tripping? All I can report is that no further trouble of this sort has been experienced, but a few minutes after sorting out these connections the hissing initially mentioned put in an

appearance. This turned out to be due to a kink in the e.h.t. cable as it left the top of the line output transformer socket. A new cable with a long-reach nipple was fitted and this trouble was over.

The fact that there was intermittent colour after an hour's use meant that the set came back in again for an i.c. change, but no one had mentioned that so how was I to know?

"I wish I had your job" said Dick as he dealt out the cards. "You never seem to have any worries."

I didn't hear him properly because of the wax in my ears.

# Test Report: The NLS LM353 Digital Multimeter

*Eugene Trundle*

THERE'S a wide range of digital multimeters on the market at present. Some still use an LED display, but these are now in the minority. The more recent LCD system has many advantages (unless you're working in the dark!), mainly the lower battery consumption. From the many meters available, we chose the NLS manufactured LM353. It's about the smallest DMM we've seen, and is a good example of the current trend towards the miniaturisation of test gear. The instrument is one of a range of several DMMs produced by this manufacturer. They share a common case size, offer a choice of LED or LCD displays, and vary in price from £69 to £195 ex VAT.

The LM353 is about the size of a PP9 radio battery and, being housed in a plastic case, can very often be sat inside the equipment under test. It's a 3½ digit type, which means that "full-scale deflection" is 1.999 and decades thereof. Since a digital display cannot go backwards or "off the end", polarity and overload indicators are required. These take the form of a + or - sign before the readout, and a steady 1 display in the event of overloading. There are a.c. and d.c. voltage and current ranges – four, from 2V to 1kV and 2mA to 1A. The resistance ranges are from 200  $\Omega$  to 10M  $\Omega$ . Power is provided by four AAA size cells, the battery life being quoted as 100 hours. Inside, the instrument consists of four i.c.s and a fair number of discrete components, arranged on three small, parallel-mounted glassfibre boards.

## On the Bench

During the two weeks I had the meter for test, it was being constantly used for TV servicing. I found that the calibration accuracy was within specification on all ranges, and that the a.c. ranges were average-sensing/r.m.s. calibrated for a sinewave input, as is usual with this type of instrument. On the resistance ranges, I found that the kilohms range had the ability to forward bias a semiconductor device (test voltage 2V), whereas the k $\Omega$ /10 range, with applied voltage of 200mV, was not sufficient to switch on a semiconductor junction. This has the advantage that many components mounted around a silicon semiconductor device can be checked in situ – a useful point, and one which may not be immediately apparent. The current ranges require the meter to drop 1V at f.s.d. on all ranges: this seems rather a lot!

I was not so happy with the LM353 mechanically. The front panel is made of wafer thin plastic material which looks vulnerable to damage, and I'm wary of the battery

changing procedure. This involves removing the whole outer case, exposing the delicate circuit boards etc. Finally, the front panel printing around the range switch is spaced in such a way that the click stops of the switch get "out of phase" with the panel legend. In the extreme case, on the direct current range, the knob tends to point more to "AC mA" than "DC mA".

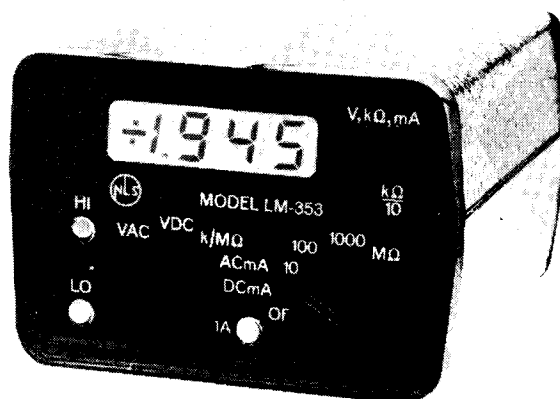
On the credit side, the main case and back cover are made of a tough, flexible material, and a useful multiposition prop/hook/handle is provided – I slipped some sleeving over this during the time that I had the meter for test, so that the instrument could be laid in a working TV set without the risk of the metal prop causing fireworks.

## Conclusion

If your requirement is for a DMM of minimum size for general purpose use, you won't find one smaller than this! It works well, but is certainly not under priced at £75 plus VAT.

One of my TV servicing colleagues long years ago regularly used to carry out his field servicing on a company Lambretta motor scooter. If the current depression bites much deeper, maybe we shall all have to return to this economic but hazardous mode of transport. Just right for the super technician who never has to bring a TV set back to the workshop (does anyone know any?). If this comes to pass, test equipment such as this meter and the baby oscilloscope recently reviewed will be much in demand!

The LM353 is available from Lawtronics Ltd., 139 High Street, Edenbridge, Kent TN8 5AX.



*The NLS LM353 "baby" digital multimeter.*

# The Shooting of Sam Magrew

*Les Lawry-Johns*

HE was a funny sort of fellow. Sort of round, if you know what I mean – five foot tall, five foot wide and five foot deep, with a face proclaiming that the Lord had not been too generous when dishing out the intelligence quota. He had to screw up his watery blue eyes to protect them from the smoke that forever issued from the fag that stuck out of his mouth – it was there the whole time he spoke, which he did incessantly while never really saying anything. He probably kept it there whilst eating as well. I vaguely recognised him as a labourer for a local builder, which perhaps explains why the local pub keeps falling to pieces.

Anyway, he came into the shop one morning, talking before he even got through the door and expecting me to understand exactly what he meant though I'd heard only the half of it. I can't possibly record his exact words, only the gist of it.

Apparently his old TV had finally given up the ghost and had been dispatched to the graveyard. As a replacement, his sister had given him a "new" Bush set which had gone wrong a couple of years previously and had been stored in her loft. He would like it got going again. No, he couldn't bring it in as he didn't have a car. And he'd like it done today otherwise his old mum, who was a cripple, wouldn't have anything to watch. Which is why I nipped up there to see if I could sort things out.

It was a hybrid monochrome set – A774 chassis. Its on/off switch was faulty for a start, and as it had been stored for a couple of years I thought it would be prudent to take it back to the shop. As I prepared to put it in the car, he cheered me up by telling me that I'd been the last one to repair it, and that although his sister thought I was all right her husband hadn't liked me. I thanked him for this interesting bit of information and departed, promising to return before evening so that the old girl could see the night's programmes. Before I left he shouted out that he wanted his name put on the set, because he didn't want it changed over for one that was no good.

"Magrew. Sam Magrew. Anyone round here will tell you." I drove off wishing I hadn't got involved to start with. I couldn't really spare the time away from the shop, and I had this funny feeling...

There were several other jobs that had to be done before I could attend to Sam's set, but when I got to it I fitted a new volume control-on/off switch and checked for any obvious shorts. Switch on and the valves lit up, but as soon as the line timebase got going the e.h.t. rectifier's heater winding on the output transformer started arcing. This wasn't surprising, in view of the fact that it had been stored. So I pondered upon the wisdom of either fitting a new transformer or simply replacing the heater winding and keeping my fingers crossed. Totting up the cost of a new transformer, plus the on/off switch etc., I came to the conclusion that the total would be no mean factor to Sam, who'd had the set given to him anyway. So out came the DY802's holder, and some e.h.t. cable in sleeving provided the winding. I knew this was a mistake, but like a fool kept

on. The e.h.t. now came on nicely, and there was good sound. But sync was nowhere in sight. The sync separator transistor is tucked away on the left centre, near the vertical strut. It proved to be open-circuit. On replacing this the picture locked and looked good. So I stuck the set in the car and nipped it back smartly.

"Fifteen quid" bawled Sam, "I could have got a new one for that." The old girl tutted in agreement. Sam pulled out a wad of tenners and fivers and peeled off the fifteen.

"I hope it ain't going to give no more trouble after all this."

I began to loose my cool. "If the set's been stored in the loft for a couple of years, I'm responsible only for what I've just done, not the rest of the bloody thing."

## Another Visit

Next morning Sam reappeared. "We saw the telly for just four hours, then it went off again. My mum's not very pleased I can tell you."

So we popped up and found that the line output transformer had given up the struggle. I put a new one in, with a stick rectifier, and carefully checked the drive and operating conditions, shutting my ears to the uncomplimentary conversation that was going on in the background about my abilities as a repairer of tellys. I'd intended to waive the charge on the transformer for the sake of customer relations, but as I could hear that these were already at a low ebb I cheered Sam up by asking for another tenner. This wouldn't put the balance right, but would help a bit. There was immediate uproar, and I think he said something about going to the race relations. This seemed a bit queer, but I eventually got out and beat a hasty retreat.

## The Final Visit

You'll never guess who turned up next morning. Hard things were said. Suitably translated, the gist of his comments were to the effect that when he'd paid through the nose for a job he expected it to have been done, not half done. "What about the pub that keeps falling to pieces" I asked? "That's nothing to do with me, I only mix the cement."

So up we went again, and I was shocked to find that the new transformer had a short between windings, as a result of which the smoothing resistor lit up like a firebar. I told him I'd take it down to the shop to check it thoroughly, but he didn't listen because he was moaning about the money he'd already spent. So I counted out the exact sum he'd paid and put it on the table. Like a flash he grabbed it.

"You had the set given to you, and now you've grabbed that you haven't paid a bean. The only looser around here is me." That was my swan-song.

"Leave the set alone" he said unnecessarily. "I'll get Dave around the corner to fix it. He'll do it in no time and won't charge either."

On leaving, I felt I'd done something wrong somewhere. I've shortened the story so as not to bore you – in fact two new line output transformers had had to be fitted, and both had shorted to earth through the windings after some five hours' use. The line drive waveform appeared to be perfectly correct.

It was probably all my fault, but Sam's attitude was less than constructive so it was possibly six of one and half a dozen of the other. If you happen to meet a Bush set with an A774 chassis and a new line output transformer with a short, be careful.

I had a dream that night. Sam Magrew was at the bar

telling everyone that Long John Lawry was a bum. As I entered through the swing doors, Sam went for his gun and I went for mine . . .

### ***It Never Rains***

After that awkward epic, we just had to have another. Nothing complicated, just a Bush colour set fitted with the A823 chassis. No field scan after working normally for a few minutes. So we checked the vertical scan balance control 6RV2 and resoldered the pegs of the pincushion correction phase coil 6L20. No trouble at all, no more field collapse. Run the set for twenty minutes or so, then await collection.

Half an hour later there was a phone call to say that the colour had gone. Back it came. Change decoder panel: still no colour. Change i.f. panel: colour restored. Attack chroma amplifier and change little round transistors, fitting better known ones. Lovely colour. Check for thirty minutes. No loss of colour, no field collapse.

Next day there was a phone call to say that there was now no sound or raster and would I call as they thought that carting the set around was having a bad effect on it . . . So off I went. Blown l.t. fuse due to the BY164 l.t. rectifier being short-circuit. Fit more manly BY225 bridge and new fuse. Sound o.k., picture o.k., colour o.k. Would I mind if they gave the set a few days' trial before popping the money in?

### ***Colour Faults***

Three Thorn colour sets (3500 chassis) appeared in rapid succession. All with colour faults that may be of interest.

The first gave a nice monochrome display, but when the colour control was turned up only blue and green were in evidence. This ruled out a good 80 per cent of the decoder circuitry, so we settled down to check the R - Y channel, from the bridge demodulator onwards. Our first suspect was the small electrolytic which couples the signal to the base of the R - Y preamplifier transistor on the video panel. This turned out to be all right however, so we moved back to the decoder panel. The filter choke L304 between the bridge and the output connection was open-circuit. Repair the choke and full colour is restored.

Feeling pleased about this quick one, we turned to the next. No colour. Check for presence of gating/blanking pulse from line output stage at 12/9. Present. Check at other side of pulse coupling resistor R351. Pulse still there. Check presence of chroma signal from i.f. panel at 12/4. Present and correct. Check for presence of colour turn-on voltage at base of chrominance amplifier transistor VT309. Nothing - there should be 17V at TP2. Check back through the circuit and find that the emitter-follower transistor VT305 is open-circuit, preventing the 4.43MHz reference signal going any place. Replace VT305. Nice colour. Another quicky! Could our luck last? No it couldn't.

The next one was a bitch. It needn't have been, since we'd had the same thing a couple of years previously. But suffering from senile decay as I am, I can never remember these things until I've spent a lot of time rediscovering them. So round and round the decoder we went, looking for the cause of the loss of colour. The basic problem was that the ident signal was missing. Think carefully about the ident stage. The 330Ω emitter resistor is decoupled by an 0.22μF electrolytic. Maybe this had dried up, killing the ident signal through negative feedback action? Bridging it seemed to restore everything to normal, but a replacement failed to make any difference. Tap the stage and the colour came back. Turn the set back upright and the colour went. Then it

dawned on me. Removing the 7.8kHz coil's can revealed a sliver of solder which had obviously fallen into it during the course of a previous line timebase repair. Just as in the case two or three years back.

Why my brilliant, retentive memory keeps failing me like this I don't know. Honey Bunney says it's all these sex books her cousin brings in for me. He has lots of technical books given to him as surplus by someone who collects them from newsagents, and scattered amongst them are these naughty books I find of some small interest. But I don't really think they cause loss of memory.

### ***No Field Scan***

A Philips colour set (G8 chassis) was a little too large for its owner to bring in, so we had to pay it a call. The fault reported was no field scan, and as this can be a little awkward at times we took a spare timebase panel with us. This was as well, since on checking the voltages around the two BD131 output transistors everything seemed to be about right. So we fitted the spare panel, then spent some time on other little jobs that needed sorting out - grey scale, convergence, etc. Having satisfied the lady of the house that the set was now in 100 per cent condition (even though the original complaint had simply been about the field collapse), we took the faulty panel and ourselves back to the shop.

On the bench, the panel was checked. The transistors and the BRY56 s.c.s. all appeared to be in order, but the field charging capacitors C4451 and C4452 were virtually open-circuit. Replacing these electrolytics and applying about 30V to the supply connections F1 and F2 proved that the panel was now working - because of the buzz from the loudspeaker of the signal tracer - but as we didn't have a G8 around we couldn't tell exactly how well the panel was performing. When one did come in, for a new line output transformer, we took the opportunity to check the panel. The height and linearity were not up to standard, and although the BD131 output transistors read all right on a meter new ones had to be fitted to restore some range to the operation of the presets.

### ***Dog Attacks Vicar***

Ben is fairly large as rough coated collies go. Placid too, as far as people are concerned. When it comes to territory and other dogs however, it's a different story. His pet hate is a black dog which comes past with its owner and marks his patch as it were. If he could get out when that dog passes there'd be an awful reckoning. The problem now is that Ben's dislike of that dog appears to have turned into a pathological hatred for all things black. For example, there's a lady who passes with a black shopping basket on wheels. This makes Ben go berserk.

Well the other Sunday morning we'd just returned from our walk and I'd slipped Ben's chain off prior to opening the door when I caught sight of the vicar toddling down the road, supported in the main by his rolled umbrella.

"Morning vicar." I'd hardly got the words out when Ben rushed straight at him, with every hair standing on end. Not a pretty sight. Ben's teeth fastened on the black umbrella, and the vicar was robbed of his support. Fortunately Ben realised his mistake at once, and looked rather sheepish even before I cuffed him round the ear. But the vicar was going round in circles trying to stay on an even keel. I tried to help, with the result that we both gyrated around a couple of times. Profuse apologies were offered and accepted. "It's your umbrella" I explained, "it's black you see."

Needless to say, Ben's been in the dog house ever since.



# *It Started to Say Something . . .*

*Les Lawry-Johns*

I WAS busy sitting at the typewriter wondering what on earth to write about when this young lady came in carrying a small colour portable. A corker and no doubt about it: a vision of loveliness with that elusive quality called style. As she approached I suddenly remembered what life was all about. None of that twaddle about what we are here for and the hidden meaning of life.

"I wonder if you can help me?" she asked quite unnecessarily. "This is our second set, but when we switch it on it starts to say something then stops. We switch it off and on and it just about comes out with another word then packs up again. I know that sounds silly, but I'd be very grateful if you could get it to say a sentence at least." Plus a sense of humour . . . "It's a Philips. K9 I think."

I looked at her carefully. It was a KT2 actually, which is not far removed from the current KT3. Not at all like a robot dog. All good fun, so I grabbed the pad.

"Could I have the name, address and telephone number please?"

"My name's Knell. E. Knell." The pen nearly fell from my hand. Could this be the legendary . . . Had she come all these thousands of miles to test me? But I kept my cool.

"Could you call back in a couple of hours, please. We'll have it done to your complete satisfaction er . . . well, done. Never fear . . ."

"All right then. I'll get my husband to pop in later to collect it."

After she'd gone I pulled myself together. What a fool I'd been. What rot to think . . . Anyway, I'd rather rashly promised to have it ready in a couple of hours, talking normally and hopefully showing a picture as well. So off came the back cover. Plug in aerial and select BBC-1. Switch on. It came on, said "well", then lapsed into silence. Obviously the protection circuit was protecting something or other against something or other . . .

So I turned it on its face and switched it on again, noticing this time that with the volume turned down so that it couldn't speak there was a hiss and a subdued crack from the top of the cabinet around the e.h.t. connector. Switch off, remove e.h.t. connector and suspend it well clear, then switch on again. This time it continued to function, even to talk when the volume control was turned up.

There was no deterioration on the e.h.t. cap, and thorough cleaning of the top of the tube (very little clearance) showed no muck that might have promoted a discharge. So we put the cap back and tried again. The set remained on, but a hiss could be heard and with the lights out a faint blue haze could be seen from the top of the tube to the Rimband. Off came the connector again, and we renewed our efforts around said area with silicone. This time there was hardly any hiss when we refitted the connector, and what there was stopped when we reduced the chopper-regulated h.t. supply from 131V to just under 130V with R405. We now had a set that talked and produced a splendid picture as well.

You won't believe this, but an hour or so later a little grey-faced man crept into the shop and enquired as to whether his set was ready.

"What name sir?"

"Knell. My wife brought it in earlier."

So there you are. Here am I, a fine strapping figure of a man bursting with health, and here is he, an empty shell of a man, sapped of his manhood, old before his time. Lucky man.

## *Enter Jacko*

You may recall Jacko. I have great difficulty keeping him away from Honey Bunch because he always thinks it's New Year's Eve, even in the middle of May, and Honey Bunch thinks it's great fun to hop around keeping at arm's length but always manages to get caught before Jacko gets puffed out. Anyway Jacko turned up with his Pye 697 (hybrid colour chassis) complaining that all he could get was a white line.

"Good" I said, "it shows what perfect convergence you have."

"Let's not talk about me" said Jacko, "it's the set I'm on about." Which spoilt my little joke.

Now field collapse on a Pye hybrid colour set doesn't necessarily mean that the field timebase has ceased to function, i.e. the trouble need not be on the field timebase subpanel at all but in the long interconnections via which the supplies and the field drive come and go. Our first step was to ensure that the positive and negative 20V supplies were present at the output transistors. Yes. So we connected an audio signal tracer to the field output tag D in order to hear the field buzz. Loud and clear. The separate 20V supply to the height control is not important in cases of field collapse incidentally, since if it's absent – as it often is when the zener diode D52 on the main panel goes short-circuit – the effect will be lack of height rather than complete loss of scan. Complete collapse more often means an open-circuit somewhere in the long path from output tag D to chassis. This embraces many connections, tracks and leads.

Since there was a nice healthy buzz at tag D, we followed the green lead up to the top right edge connector on the power board, then down and across to the side edge connector. This is fairly easy if you know these sets, but is a bit tricky for those who don't because of the jump leads on the component side of the board – these are not marked on the print side. The circuit is then from the side edge connector to the scan coils, back to the edge connector and up to the convergence panel edge connector, with a link from here to the shift control on the power board. All this gives plenty of scope for poor contacts or hair cracks in the print runs.

By the time we'd proved the continuity to and from the scan coils the scan had opened up and no amount of pulling or pushing, tapping or bending would make it collapse again.

Whilst I was thus engaged, Jacko informed me that two (of the six) buttons were unusable. I told him he still had four, but he took the view that if two were gone the others would not be far behind. So out came the tuner head or selector unit (or whatever you like to call it), and we settled down to fit the replacement which had been up on the shelf for some time, together with ten million other bits and pieces which we order just in case they might be needed



(this is the reason for our destitution, and why H.B. and I have great difficulty in getting our ends to meet). Fit selector unit and switch on to align buttons.

There was a white line across the screen of course.

"We haven't got very far, have we?" commented Jacko.

I decided on another line of attack, since the first effort didn't seem to have been very rewarding. Switch the set off and make continuity checks from tag D through to the edge connectors, through the scan coils, then up to the convergence panel. Here my eyes crossed and I got mixed up a bit, but the reading down to the slider of the shift control seemed pretty low. The field coupling capacitor C455 on the convergence panel looked all right and anyway doesn't give trouble. All in all then a pretty fruitless exercise.

I made an unkind comment about the parentage of the Pye 697 range in general, and Jacko reminded me that I'd recommended and sold him the set in the first place. So we switched it on again and of course there was a full scan. It was Jacko's turn to query the set's parentage.

By now I'd convinced myself that on this occasion the trouble was not to do with the print or connections on the

power board, and that as the field coils are in parallel the most likely suspect was the convergence panel. Further checks here revealed that the slider of the field R/G symmetry control RV40, which is in series with the scan coils, was dry-jointed. When this was made good harmony was restored all round.

"Took you a long time" said Jacko unkindly.

"That's true" said Honey Bunch, appearing briefly on the scene. "Most things seem to take him longer lately." So saying she vanished as quickly as she'd come.

"That'll cost you fifteen quid" I snarled at Jacko. "Pay up and clear off."

"You blokes must be making a fortune. I'll do it myself next time." Exit Jacko.

### Interlude

Enter small boy.

"Have you any plugs mister?"

"Lots son."

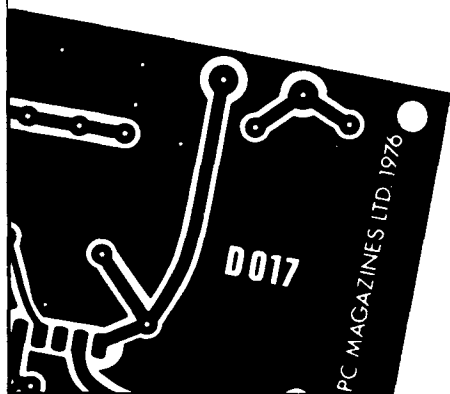
"Stick 'em up your socket then!"

Bring back the stocks I say.



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# Knowing One's Job . . .

*Les Lawry-Johns*

EACH day that passes convinces me more that I don't know my job and never will. The fact that we successfully service thousands of sets is pure luck, backed by a little knowledge of some basic facts and polished by our experience gained over the years. Look at what happened yesterday for example.

A chappie, with some help, brought in a large Baird console that had a Thorn 3500 chassis lurking somewhere within. "Smoke" he said. "Lots of grey smoke every time we switch on." This to me meant that the fault was not a serious one, since there was not enough current passing to operate the trip – assuming that the trip was intact, and that it hadn't been shunted with 30A fuse wire. So I took a look inside and was surprised to find a strange small panel lying on the bottom left video board, connected by wires to the convergence assembly. It consisted of a couple of coils on magnets, with a knob for adjustment. Realisation burst upon me that it was the blue radial convergence assembly, snapped off the main block – probably by a heavy hand.

"The smoke comes from up here" he said, indicating the top right line timebase and beam limiter department.

"How long since this bit was snapped off?" I enquired.

"Oh that's not important: it was like that when I got the set a couple of years ago."

"That's not possible" I said with authority. "You just couldn't watch the picture with that off."

I removed the line timebase panel however, and found that C514 (4.7µF), which decouples the h.t. supply on the panel, was looking decidedly distressed. So I replaced it, refitted the panel, and switched on: first to prove that the smoke no longer issued and that the set worked, and secondly to show that you just can't do without blue convergence.

The picture took some time to appear, due to the age of the tube, but when it did become watchable (just about) it had only slight misconvergence. No doubt if the blue gun had been up to scratch the misconvergence would have been more noticeable, but there we were and I couldn't argue.

"That'll do me Lawry, at least until I start work and can afford one of those things you say I need." And off he went, after I'd secured the loose convergence assembly to prevent it shorting anything out. I was afraid to try fixing it back into its approximate position you see, because it might have messed up the convergence . . . Who needs blue correction anyway?

## **Another Failure**

After this queer one, another one just had to follow. It was a Bush set, fitted with the Z718 chassis. I'd recently replaced the e.h.t. stick, as the original one had been causing the set to trip. So naturally the owner brought it back saying that the new stick was defective as the set was still tripping. It continued to do this with the stick disconnected, so even the owner had to admit that it must be something else. But what?

Tests proved that the line oscillator was working, and that line drive was reaching the output stage. To my

befuddled mind it seemed likely that if the line output transistors were o.k., the line output transformer had probably taken exception to the load presented to it by the faulty stick, but I was loath to accept this diagnosis, mainly because I didn't have a transformer in stock. If it had been the T20 chassis, I'd have fitted a new line output transformer without hesitation, but the Z718 chassis is a different proposition altogether in this respect.

So I checked the line output transistors and found slight leakage in both. Two new ones went in and made no difference at all. "I must have the set today, because I'm going abroad on Monday and I must leave it working for the family." More frantic checks, all to no avail.

"I think it's the line output transformer" I confessed, "but I'm not sure. Nip it up to Geoff in Moon Lane and see what he and Eddy think. Two heads are better than one, and they probably have a transformer they can fit today." So off he went, leaving me with a severe dose of lost confidence, something that always makes me mean to the cat.

Some time later Geoff phoned to say that it hadn't been the transformer, and that Eddy had met this one before. After some preliminary checking, he'd diagnosed a faulty potentiometer – the NS pincushion phase control 5RV2. Later I had a look at the circuit. The defective potentiometer was presumably loading the field output stage, and as this obtains its 32V supply from the line output stage there would be an excessive load here as well.

## **Every One's a Killer**

"Before you go" Geoff continued, "there's a little story you might like to hear." Apparently an engineer friend of his had been attempting to deliver a set to a customer, but couldn't get in through the front gate because of the ferocious dog that was barring his way, barking its head off.

The lady of the house looked out of the window and gave him instructions. "Kick his balls and he'll be friendly" – meaning the small balls it played with in the garden of course.

"If you'll turn him round I will" bawled the frustrated engineer.

"You horrid man. I'll report you for this."

Thank you Geoff. Every one's a killer. "You haven't heard anything yet" continued Geoff, warming to his task. "You remember Sam Magrew whom you described with such loving detail in the April *Television*?" As if I could forget him.

"He's on our back now. Came in for the cheapest colour set we could offer him, which also turned out to be the heaviest, a Thorn 3000 with sliding doors and all mod cons. Bloody great thing. Delivered it to his house and left it working fine. Next day he came in to say the set wasn't right and what were we going to do about it? Went up there and found that his crippled old mum had lugged it round to the other side of the room and mucked about with the aerial plug etc.

So we put that right and left it working again. We've been up there half a dozen times since to sort it out. She (or is it he?) can't leave it alone for more than a couple of hours.

I wish we'd never set eyes on him."

"What a shame Geoff" I tittered. "If there's anything I can do to help, like pushing him off the end of the pier, just let me know."

### **No on/off**

A common complaint in recent years is that "the on/off isn't working." This is the customer's complaint, or rather statement, based on the fact that when they switch on nothing happens. Once in a while, usually after a lengthy explanation has been given as to why the switch need not be at fault, it turns out that they are right and the customer looks at you pityingly and says "what else could it have been?"

In the majority of cases however they're wrong and you could be on to a merry chase, especially if the fault is intermittent and the set comes on when you are about to make a key measurement that would solve the problem. The Philips G11 chassis is a particularly apt example: the upper right line output board can cunningly conceal dry-joints that contact at the slightest vibration. How you tackle this sort of thing is a matter for personal preference: resoldering every joint on the board may seem silly and time wasting, but it's often the only long term remedy if call-backs are to be avoided.

### **A Tedious G9**

A recent time waster was a Philips set fitted with the G9 chassis. It turned out to have two intermittent faults, one producing the "dead set" symptom and the other an audible tripping as the h.t. line rose to 125V and then collapsed to zero, rising and collapsing cyclically. The faults would then clear and the set would behave impeccably for the rest of the day. We eventually managed to make some brief measurements at one or two points on the power supply panel, and discovered 10V across a 7.5V zener diode. When we replaced the diode the faults seemed to clear, but on switching on next day the h.t. was haywire again with a narrow, fluctuating picture.

We spent much time on the power supply panel, since the fault would clear for long periods. Whilst making a couple of adjustments on the line scan panel however we accidentally found that the fault could be provoked by

applying pressure around the centre electrolytic C138 (2,200 $\mu$ F), which decouples the emitter of the line output transistor and acts as a reservoir for the 45V supply obtained from the EW diode modulator. Thinking that we were on to a dry-joint, much time was spent in the happy pursuit of resoldering, to no end of course. We then did what we should have done initially: we removed C138 and found that its end tags had deteriorated. A new electrolytic restored reliable operation, once the beam limiter had been set up correctly.

### **Enter the Flower Seller**

A gypsy lady then came in and offered either to sell me some flowers or tell me my fortune. She seemed remarkably like the fortune teller I'd encountered at the seaside on that rainy summer day all those years ago – the one who warned me about the blue tants in Bob's TV set twenty years later. Not a person to be trifled with, even though it had cost me two and sixpence at the time. Seeing that I wasn't going to buy any flowers, she gave me a sample of her psychic power.

"You're not appreciated" she said. "People take you for granted and don't reward you enough for what you do."

"That's true" I agreed immediately. "Television sets cost no more now than they did ten years ago, so people don't want to pay any more for the repair than they did then, but everything else has gone up ten times. That's why I'm poor while everybody else is getting richer."

"You'd be better off emptying dustbins" she sympathized. "You need one of my lucky charms, then you'll be able to get away with charging more."

"Our dustbins aren't emptied" I protested. "We have to put our rubbish in these black plastic bags which they throw into the back of a big lorry thing with a big screw that goes round and chews everything up, and the dustmen tell me that if I don't give them a bigger tip this Christmas they'll throw me in and I'll be screwed."

"You'll get screwed if you don't stop talking rubbish and get on with some work" said Honey Bunch, trotting down stairs. "Oh what lovely flowers! Can I have some?"

So she and the flower seller lady engaged in some hard bargaining, whilst I was left out in the cold as usual without finding out whether red tants are any more reliable than blue ones.

## **SERVICE NOTES FROM PHILIPS**

**G11 chassis:** Due to spreads in the characteristics of the TDA2591Q line oscillator/sync separator i.c., line jitter can be experienced. To overcome this problem, a 27k $\Omega$  resistor has been added in parallel with C2029 (0.1 $\mu$ F).

In models with full infra-red remote control, the SAA5000 i.c. (IC3606) used in the hand-held remote control unit has been superseded by the SAA5000A i.c., which has a lower power consumption. Along with this change, the values of R3601-5 and R3609 have been increased from 33k $\Omega$  to 100k $\Omega$ .

**KT3 chassis:** In sets that include teletext facilities, the value of C2160 in the i.f. module is 33pF – it's 120pF in non-teletext sets. A few cases of poor data capture have been reported due to C2160 not being of the correct value.

**K30 chassis:** To prevent power supply shut down when tuning, the value of R7322 on the U11 supply drive/control panel has been reduced from 3.9k $\Omega$  to 2.2k $\Omega$ .

To increase the field flyback blanking period and prevent

the vertical interval test signals causing interference at the top of the screen, a 15pF ceramic plate capacitor has been added between the collector and emitter of transistor T1535, mounted on the print side of the panel.

**TX chassis:** On some sets a light vertical line may be present near the left-hand edge of the screen, more noticeable on dark scenes. The following modification should clear the trouble. Add a BY207 diode and a 10k $\Omega$ ,  $\frac{1}{4}$ W resistor in series between the anode of the 95V rectifier diode D453 and the emitter of the video output transistor TS560. The anode of the added diode is connected to the anode of D453, i.e. the junction of R450/D453. Cover the diode and resistor with PVC sleeving, and connect a 7in. (18cm) length of wire to the free end of the resistor. The wire is taken to the video transistor: position the components in the sleeving along the near edge of the panel, away from the line output transformer, and keep the length of wire away from any components that generate heat.

# The End is Nigh

Les Lawry-Johns

I can't help feeling that the end is near. For years I've been kidding people that I know my job and have some sort of crystal ball I look into and immediately know what's wrong with every piece of equipment that comes in, be it a telly, radio, cassette, record deck, depth sounder, automatic pilot, diathermy unit (flesh cutter with a high-frequency probe I think) or what have you. Now I don't seem to be able to get anything right, be it a bread and butter TV set or the decoder in the Mitsubishi CT200. As for these switch-mode power supplies that shut down at the drop of a hat, what's wrong with fuses for heaven's sake? They're not wholly electronic I suppose.

Say for example that an e.h.t. tripler plays up. Once upon a time a fuse in the supply would fail. So you unhooked the tripler, checked the h.t. current with a meter to ensure that it was normal, fitted a new tripler and went to bed. Now when a tripler plays up the power supply senses the overload, shuts down, starts up and shuts down a couple of times and then lapses into sullen silence. In the meantime this huffing and puffing deals the bloody line output transformer a mortal blow, and if it continues to function for the present it'll certainly fail next week, with more huffing and puffing from the power supply. They even shut down when there's nothing wrong, adding chaos to the mayhem.

No, it's all too much for me. Human Rights have been a great benefit to suffering humanity. We never get a second thought. Even when you're having a quiet kip on a Bank Holiday afternoon, the editor rings up and says "don't just sit there, do something". (May Day wasn't intended for the rich owners of department stores – one department for the customers, one for the stock and another for the staff, including cat and dog – editor.)

So I'm busy carving my headstone. I don't trust these stonemasons. So far I've managed to chip out:

Here lies the body of LLJ,

He twisted and turned but couldn't get away.

## The Thorn 8500

All this is leading up to the saga (amongst others) of Mr. Piddlewell and his Thorn 8500 colour set. He plonked it down and said it didn't go except for a faint buzz when it was first switched on. "It must be the on-off switch" he informed me. "Rubbish" I replied, "if it was the on-off switch it wouldn't even buzz. Hang on and I'll take a quick look."

With the back off, we could clearly hear the degaussing coils doing their bit when we switched on. There was precious little else however. Unfortunately it wasn't an 8000A, which has a 12 $\Omega$  dropper instead of a mains input choke. That would have been easy, as the fault would probably have simply been an open-circuit dropper. Anyway, in addition to the choke there's a thermistor (usually), so a quick check was made to ensure that it was intact. We next moved the probe to the thyristor's anode – and the set immediately sprang to life, frightening Mr. Piddlewell out of his senses. He jumped back like a scalded cat. "Don't do that when I'm not ready!"

"Sorry" I said. "I didn't know the prod was going to prod it into action. Let's try it again." So we switched off, waited a while, then switched on again. Nothing happened apart

from the buzz. "We've got to creep up on it" I told Mr. Piddlewell.

"You creep up on it" he said. "I'm standing well back this time."

So we tried to be methodical. We first checked for the presence of the mains-derived 25V regulated supply, since this provides the power for the thyristor's triggering circuit. The 25V was present and correct, but it was difficult to make sense of the other voltages because the h.t. voltage hadn't been established. So we checked for voltage at the anode of the thyristor, and the whole thing immediately sprang to life again. In fact anything metal touching the thyristor's heatsink or the diode in series with the thyristor on the input side started the damn thing up. So for want of anything better to do, we changed the diode and the thyristor. The thing then started up without any prodding. We hastily put the back on and started to prepare Mr. Piddlewell's bill.

"It's gorn off" he said.

I stopped writing, closed my eyes, gritted my teeth and rocked back and forth slowly. Off came the back and the testing (me or the set?) started again. Nothing made sense till we touched the input to the thyristor. All services were then restored.

"It's a loose wire" said Mr. Piddlewell helpfully.

"\*\*\*\*\*" I replied.

I then started mumbling to myself about trigger pulses arriving too late or not at all, and again removed the panel. I changed the three transistors in the trigger circuit, all suspect resistors, the relevant capacitors and the two diodes. The set then worked faultlessly, and off went Mr. Piddlewell without his bill – just in case. The next day he came back.

"It went off half way through the football" he gritted. "Leave it with me for a few hours" I sobbed.

Alone again, I crept up on it. The 25V line was o.k., and any attempt to check on the a.c. side restored the set to life. Out came the panel and, with it suspended by the wiring, I tried to take some readings without touching any point that would prod it back to life. Unfortunately I was stupid enough to allow the 25V regulator's heatsink to touch one of the a.c. mains tags on the input choke. There was a flash and the fuse blew.

With a heavy heart, I checked the 25V regulator transistor. It was short-circuit of course. I replaced it, but there was obviously some sort of short somewhere along the line as the 51 $\Omega$  resistor in series with the transistor was overheating. Disconnect the 25V output plug 10/5 to the decoder/i.f. panel and the short clears. So we set about the tedious task of checking for shorts on this panel, and finally found it on the small a.f.c. subpanel, where a disc capacitor had gone short-circuit.

This was replaced, and on refitting the plug the BBC World Service commenced to read us the news. I'd met this one before and immediately accused the small eight-pin chip (MC1330 or equivalent, video detector) of playing about. Replacing it rewarded us with more normal sound, but not a sign of a picture as the MC1327 chroma demodulator/matrixing i.c. had also been dealt a mortal blow. With this replaced we had a picture and everything seemed to be in order. It then dawned on me that the power supply still had an intermittent fault, and sure enough the

next time we tried to start it nothing happened until we touched the input to the thyristor.

At this I lost my cool. I took out the 4443 thyristor, replaced it with a 4444, and shorted out the series diode so that the full a.c. was applied to the thyristor. "If you need a prod" I said, "have one!" No further trouble has been experienced since then, and if the trigger circuit really was at fault it hasn't said so. Mr. Piddellwell has his set back, and will pay (I hope) when it has worked for a week without fault. So sorry you've been inconvenienced sir.

### **More Black Comedy**

Following that I'd have liked to have had a nervous breakdown. There wasn't time however. An ITT CVC32 came in with the power unit tripping.

Removing the line oscillator panel stopped the tripping, so we checked everything in the line output stage, noticing that a new tripler had recently been fitted (not by us). Now if all the diodes are o.k., together with the line output transistor and the scan-correction capacitor etc., one has to look askance at the line output transformer. Upon fitting a new one normal operation was restored. The moral here seems to be that if the tripler fails the transformer is also suspect, which pleases the customer no end.

When the second CVC32 came along therefore you could say I'd been brainwashed. When it was switched on it tripped a few times and then went quiet. So I took out the oscillator panel and the set stayed on with a whistle to say that it was unloaded. I checked the line output stage – transistor, diodes, etc. – having already unhooked the tripler to no avail. "The transformer's gone" I thought.

So I fitted another and left the tripler disconnected. The set behaved exactly as before. A couple of humps, then back to silence. It then occurred to me that I hadn't checked the overvoltage preset (the bottom one). A slight touch on this restored the supply line and enabled us to set the thing up according to the book. Caught again. Back went the old transformer (sorry to have bothered you), on went the tripler (sorry to have suspected you), and the set was left on test for some hours just to be sure.

In passing, the model had full remote control. This functioned very well, but the off button didn't seem to be very positive in its action on the switch relay, or rather the relay seemed to be sluggish in its action upon the on-off switch. We didn't pursue this as something else was occupying our innermost thoughts – the previously mentioned Mitsubishi set.

### **Decoding a Decoder**

Surely for sheer complexity the decoder used in the Mitsubishi CT200 must take the cake. Not, I hasten to explain, that I'm an expert on decoders, and I rarely tackle any kind of imported colour sets apart from those we've sold ourselves. The reasons for our reluctance to become involved with all the Sonys and other far eastern solid-state colour sets around are first because we don't feel inclined to stock up with spares which we may or may not need to use, and secondly because I'm a coward and hesitate to tackle anything I'm not familiar with.

A friend had had a great deal of trouble trying to get his CT200 fixed however, and had been without it for months. So in a weak moment I said I'd have a go at it, as nothing should take that long to sort out. The complaint was simply no colour. We looked up the circuit and received our first shock – all those f.e.t.s and other transistors dotted all over the place, in addition to one i.c. and two crystals . . .

Since the chroma demodulator i.c. drives the three colour-difference output transistors, this seemed a logical place to start. Injecting signals at its outputs got the output transistors going and produced pretty coloured patterns, but it was hardly surprising to find that this was as far as we got since there was no voltage supply to the i.c. The rectifier (D605) which provides this was open-circuit – it's right over on the far side of the panel. Replacing this restored correct voltages around the i.c., but precious little else. So we plodded backwards and found that the final chroma amplifier Q607 was open-circuit. Replacing this didn't help much either, so we went back and found (cutting a very long story short) several bipolar transistors and one f.e.t. defective.

Rotating the colour-killer control now gave us some bars of colour which couldn't be locked. This was not surprising, because there were hardly any burst gating pulses reaching the two reference oscillator control loops (it's one of those non-PAL decoders). They were present at the input to the decoder panel, but got lost on the way to the gating transistors. We finally found that the choke (L608) across which they are supposed to be developed apparently had shorting turns – it never gave the same reading twice. Replacing this with a coil (complete with core and shunt capacitor) from another decoder sent gating pulses where they should go, and we had colour which locked once we had realigned the coils (these had been disturbed, along with every preset on the board).

We could now rotate the colour-killer control to its proper setting, and decided to change channels to see whether lock was maintained. The button we pressed had not been set to a channel, so we got only a hiss on the sound and no picture. There was also another hiss apparent however, coming from the vicinity of the tripler. Before we could switch off there was a loud splash, and something appeared to be aflame somewhere down in a covered section.

Once the immediate panic was over, we found that there's a 200M $\Omega$  bleed resistor housed in a long vertical tube of heavy insulating material at the e.h.t. tripler's output. The insulation had broken down, and there'd been arcing across to the nearest earthed point. There was also a mound of silicone "putty" around the top of the tripler, so it would seem that a discharge had occurred earlier in the set's history. Perhaps this was the reason for the multi-faulted decoder board.

With the discharge problem overcome, we turned to the tuner again and tuned it in. Sound o.k., picture o.k., no colour. Gating pulses were still getting through, and we then found yet another 2SC710 transistor open-circuit, making four of this type we'd replaced. Is there something about this type of transistor that makes them hypersensitive? We fit BC108s and get no more trouble.

We again had colour, but it still seemed to lock weakly on channel change. After that brief second of hesitation however it couldn't be faulted so we called it a day.

Many, many hours had been spent on this hideous decoder, much of the time finding our way around it and trying to understand the meaning of some of the terms used. With thirty odd transistors including the colour-difference output ones, four f.e.t.s, an i.c. plus another half a dozen transistors on the same board for the luminance channel etc., this must be something of a record. Mind you, time could have been saved if I hadn't inadvertently consulted the CP140 decoder circuit instead of the CT200 half way through the proceedings.

If I worked for anyone other than myself, I'd be sacked on the first day.

with each other of course.

The Philips system is the most sophisticated one (and therefore the most expensive). A high-power laser is used to cut the master disc, from which copies are pressed. The player uses a low-power laser, currently gas but eventually semiconductor, to read the vision and sound signals on the disc. A servo system keeps the laser beam centred on the information track as the laser scans the disc. This totally contactless system has a number of advantages. No wear of course, while fast forward or reverse with picture, jumping from frame to frame by number and freeze frame are features easy to incorporate. The wide optical bandwidth gives excellent picture quality, and dual-language or stereo sound has been possible from the start. These features have made it a natural choice for educational use, and the system has recently gained the backing of a company called IBM for just that purpose.

The RCA CED system was second on the scene earlier this year but is number one so far as the publicity is concerned. The information is stored in the form of capacitance variations between a metalised layer within the disc and the metalised stylus used to track it. The concept is far simpler than the Philips one in terms of the electronics required, but offers far fewer features, stereo sound being a notable absentee at present. An estimated \$20 million has been earmarked for publicity this year alone. Zenith are also backing the system, and since the two companies control 50% of the US colour TV market it stands a good chance. This is something it will need – RCA admit that it took 17 years and \$150 million to develop (some industry sources put the figure at double that).

The US colour TV market is remarkably buoyant at present despite the 85% saturation and the recession, and manufacturers are looking to video to give them a boost. RCA expect to sell around 200,000 CED players this year, so the publicity alone works out at nearly \$1,000 a player,

which is not shown up in the selling price. Hitachi, Sanyo and Toshiba have also introduced CED players.

Due next year is the JVC VHD (Video High Density) disc system. JVC's parent company Matsushita is the world's largest consumer electronics company, and in the US the system is being backed by General Electric, which has the fourth largest share of the US TV market. Technically the VHD system sits between the other two, offering more features than CED but less than LaserVision (as Philips now call their system), at intermediate sophistication and end price. The information is again capacitively stored, and the metallised stylus is in contact with the disc. It doesn't ride in a shallow groove as in the CED system, being servo controlled instead.

The pricing of the LaserVision and CED systems is known, but that of the VHD system has yet to be announced. The published prices for the Philips and RCA players are \$700 and \$550 respectively, though I've seen them both at under \$400 in special sales – and there seems to be one of these every week of the year here.

### Video Separates

Something that seems to be popular here is "video separates" – a no frills, portable VCR with another module that provides the tuner and timer functions. Portable sound/colour video cameras are starting to sell well as a better alternative to cine – no processing delays, longer recording time (if you can afford the batteries) and easy sound editing. For the future, the talk is of thinner and thus longer playing tape and of small cassettes, possibly using metal particle tape, for combined camera/cassette systems. The latter could really upset the 8mm. film market, so the cine camera firms are beginning to participate actively in video developments. Be prepared for more developments to come: the video age is here!

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# There's a Funny Smell . . .

*Les Lawry-Johns*

THEY say that lightning never strikes twice in the same place. This isn't true. I don't mean that lightning has struck me – it's about the only thing that hasn't, and perhaps a quick flash might buck me up a bit. No, you know what I mean. Unusual things that anyone else would remember happen to me, but on the second occasion I find myself muddling through as usual until it suddenly dawns on me that I've had it all before and that I've spent several hours beavering away quite unnecessarily. There's probably something wrong with my prostate gland because . . . oh well, never mind.

I was trying to work out why this Bush colour set (A823 chassis) wouldn't start. A.C. was present at both ends of the surge-limiting thermistor and up to the anode of the thyristor h.t. rectifier/regulator, but I couldn't establish the h.t. supply. Anyway, someone came in with an urgent job and all the a.c. outlets were full up with soak test items that were happily doing whatever they were supposed to be doing. So I disconnected the Bush set and put it to one side, plugging in the Minivox portable that this chap who was going on holiday in an hour or two and wanted to take with him had brought in. Now I'm not all that familiar with these small Yugoslavian TV sets, having had only a single tussle

with one of them before.

Since time was limited, I did it all wrong from the start. I plugged it in and there was a hum and some noise on the sound side with the tube's heater lighting up. So I concluded that the l.t. line was o.k. and that the fuse on the top right rectifier/smoothing panel was intact, as it appeared to be. I removed the tube base socket to allow the panel to be swung open, and started to check the supplies around the line output transistor. The result was that I became confused by a collection of negative readings of a low order and in the wrong places, though I didn't have the circuit to see what the readings should have been.

After much shilly shallying, I found a supply on a socket but nothing on the next pin which should have fed the line output stage. So I chased the plug wires back, and guess where they went? All the way back to the fuseholder on the top right supply panel. The fuse was open-circuit, though the spring was clearly intact. It wasn't the l.t. fuse at all of course: it was in series with the supply to the line output stage. A meter across it gave a normal reading, i.e. no excessive current, so a new fuse was fitted and a job that should have taken minutes had, once again, taken half an hour.

"Never mind" said the owner, Basil. "We all make mistakes and I suppose some take longer to do things than others. Don't blame yourself."

"Take it back to Yugoslavia next time if you want it done quickly" I growled petulantly.

So off he went on his holiday. Who wants a holiday anyway? People get hurt on those things. You should hear them moaning when they get back. This was wrong, that was wrong. Good job I can't afford one really. We may have a half day at the seaside later in the year, to find out what Madam Martine has to say about the problems the future holds for us.

## The Smell

Honey Bunch then popped in to see if any money had gone in the till. "You haven't done much today – what's that funny smell?"

"Must be the dog" I suggested.

"It's not Ben. He's out here with me and doesn't smell any differently from usual. It's a smell like you make – I mean it's a smell like a set cooking up."

"I can't smell anything unusual" – and in truth I couldn't. So off she went to set her hair or whatever women do all day long, and I put the Bush set up again to renew the battle. This time I didn't use the isolating transformer socket, plugging it into a direct mains outlet instead – more for convenience than for anything else. The set came on straight away, so I plugged it back into the isolated bench supply and it didn't.

Like a flash my lightning quick mind grasped the reason for all this. As it had done not all that long ago when precisely the same thing happened – the mains isolating transformer had developed shorting turns, with the result that it wouldn't start up a thyristor power supply. I too could smell the smell. Anyone with half a nose could smell it. The transformer was hot to the touch when I touched it, so I didn't touch it any more. I gave it to the dustman, who apparently does a bit of totting on the side to bring his salary up to that of the prime minister.

## Return of Beardy and Non-beardy

I hadn't seen Beardy and Non-beardy for some time. On the last occasion they brought in a Bush monochrome set (TV161 I think) whose main electrolytic hissed all over me, which made them laugh no end until they got the bill. "Oh dear oh dear, such a lot of money." This time they brought in a 26in. Ferguson colour set – one fitted with the 9800 chassis.

"The picture keeps going down to a line you see, and I hit it bang on the top like that and it comes back again. My friend says it's a loose wire. We'll come back to collect it later."

When I got around to it I put the set up on the bench, with just a raster showing, and noted that the volume control slider shaft (and thus the knob as well) was missing, necessitating a finger nail to obtain adjustment. Child-proof provision I thought. Vibration caused the raster to collapse, and we were soon under the line output stage panel at socket PL851 looking for dry-joints. A couple of likely contenders (the 47V supply to the field timebase comes from the line output stage) were found and dealt with, and just for luck we checked the plug as we've found poor contacts here in the past. Replace panel and screws, plug in aerial, everything fine. So I wrapped it up and wrote out my charge for service.

When they returned, Beardy immediately looked at the

set and said "where is the knob which is missing?"

"The knob was missing when you brought it in, so don't try pulling that one on me."

"No no, the knob was there earlier you see."

"You probably knocked it off in the car then, when you put it in or got it out. It's probably still there, but it won't do you much good if you find it because the shaft has snapped off as well."

Non-beardy went to look in the car but couldn't find it. Beardy started "you will put on a new knob, and find the old one here in the shop later perhaps."

"It doesn't need just a new knob, it needs a new control since you snapped off the shaft getting the set out of the car."

This exchange continued for some little time, then lapsed. "Let us see the set working" said Beardy. I sighed and wished them gone, but heaved the set back up to show them my fine work. The raster came up nicely and remained steady, but there was no picture on it.

"Where is the picture?" asked Non-beardy.

"Bugged if I know. It was there a minute ago" I grunted, removing the rear cover again.

"The picture is on" said Beardy. "You haven't put the set right because this is why we brought it to you."

"Oh no it wasn't. You brought it in because the picture collapsed to a line and came back when you bashed the set, which was probably when you knocked the volume control off."

"No no, the picture never comes on straight away. How much have you charged us for not doing the TV?"

I whipped the bill into my pocket. "If I haven't done the job, as you say, I can't give you the bill." Obviously while tackling the field collapse fault something had had time to warm up and start working, which it didn't want to do when cold. The signals panel (i.f. strip, decoder etc.) varied slightly over the years, with the 8000, 8500 and 8800 series, but retained the basic arrangement with transistors to provide i.f. amplification followed by a chip or two. So I tried the freezer, but the thing wouldn't stop working. Eventually I found that, paradoxically, from cold there were no signals until the upper left TCA270SQ video detector etc. i.c. was sprayed with freezer, when signals burst through – not by heating it as I'd thought.

"What is that stuff?" demanded Beardy.

"Hold your hand up" I suggested.

Bardey half held his hand up and I gave it a blast of freezer. Beardy howled with surprise more than anything else, and Non-beardy fell about laughing, just as he did when the capacitor sprayed all over me.

"Right" I said firmly. "We've had our little laugh, let's get down to it. If you want the set to start straight away, we've got to put one of these funny black things in and however much you shout and bawl you'll have to pay for it."

"How much will you allow us off for the volume knob you broke?"

I'll draw a veil over what followed. Suffice it to say that Beardy and Non-beardy will not be seeking our help in future, and will not therefore adorn these pages again, despite the fact that the editor seems to find them very entertaining and appears to have an affectionate regard for everyone who gives us a lot of trouble. Funny that ... (Bring back Grace and Sid I say – editor.)

## Woman's Instinct

A Pye hybrid set (697 chassis) was brought in with the complaint no sync. Since the picture was there, though the colour was intermittent, my amazing powers of deduction



led to an instant diagnosis. The reasoning went along the following lines. Since the sound is o.k. and the picture is present, the fault must lie in the very small area between the second video transistor VT6 and the sync separator VT7 (see Fig. 1). The sound and the chrominance signals are tapped off at an earlier point, and the fact that the colour is touchy must be due to the fact that in these chassis the burst gating pulse is derived from the sync pulse. So the sync separator just had to be at fault, probably because its base bias resistor R33 had increased in value. Without a second's hesitation, I swung open the i.f. panel and deftly removed the resistor. Didn't even bother to check it, just fitted a replacement and quickly checked the sync separator transistor VT7.

Full of confidence we switched on, and got exactly the same symptoms – no sync and no colour. Things were no better after I'd been around the sync separator stage with a fine tooth comb.

By now Honey Bunch had done her hair or whatever it is that women do all day long, and was standing in front of the Pye, fiddling as usual.

"It's the contrast control" she pronounced.

"Oh yes?" I said. "What leads you to this clever diagnosis when I've been sweating here for an hour or more?"

"The picture steadies and the colour comes on when I move the contrast control sideways."

I was about to make some smart remark when realisation burst upon me. The 697 has a printed panel to which the controls are directly connected (no leads). If the earthy end of the contrast control was dry-jointed at the panel, picture information would still get through since there'd be circuit continuity, albeit at high impedance, via the colour control, but VT6's collector would not have much to offer the sync separator by way of a signal. Out came the panel and the diagnosis was proved. All systems were restored with a dab of the soldering iron.

"Now that I've sorted that one out for you, I'll go and get supper ready" she said. How I hate self-satisfied women.

## A Visit to Mr. Nasty

I thought I was selfish till the other day. I can now tell you that you and I are absolute angels, full of consideration and compassion for our wives and families, who should think far more of us than they do. Our wives should treasure us indeed. But for the wheels of fate, they too could be married to a chap like Mr. Nasty.

I called at his house because he couldn't possibly bring his set in. In fact he had to be taken everywhere by relatives in their cars, because he had difficulty walking. Except to the pub and back, which didn't seem to be any effort at all to him. As a matter of fact he was down at the pub when I called, and his wife seemed very agitated.

"Do you think you could repair the set before he gets back? Otherwise he'll say he doesn't want it done and can make do with the little portable, which he won't let me watch. He says there's only room for him to watch it, but I can listen if I sit back out of the way."

I listened to this affront to the rights of women with some doubt, but agreed to hurry up if I could. She dashed off to the kitchen, saying that she had to put the oven up high again because he wouldn't eat his dinner unless it was piping hot.

I took the back off the set: it was a Thorn 3000, with a blank raster and faint sound. A quick check on the i.f. panel showed that all the i.f. transistors except the final one (BF197) were functioning. I'd just finished fitting a

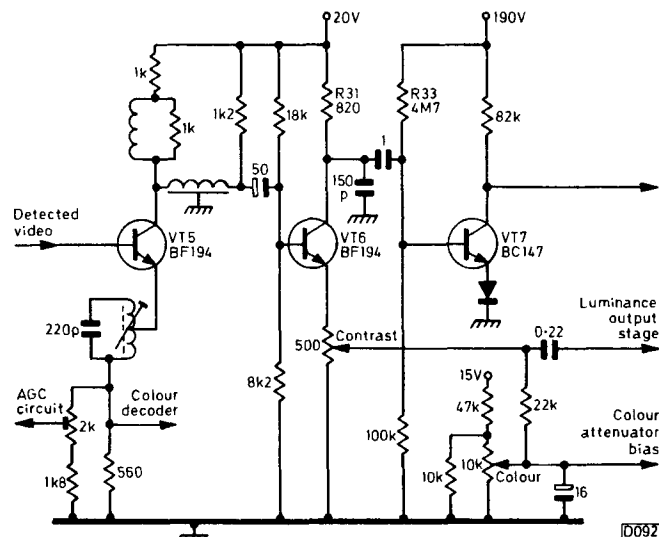


Fig. 1: Video and sync separator circuits used in Pye hybrid colour chassis. The detected video is fed to VT5, which drives VT6 from its collector and provides feeds to the decoder and a.g.c. circuits from its emitter – a separate detector is used for sound. VT6 in turn drives the luminance output stage from its emitter, via the contrast control, and the sync separator transistor VT7 from its collector. R33 provides VT7 with base bias so that it saturates when a sync pulse arrives.

replacement when there were signs of Mr. Nasty's approach. His wife became even more agitated, and snatched his dinner from the oven.

A small man came in, looked at the table for his dinner, and then looked at me.

"How much is that going to cost? Because if it's too much don't bother – I'll watch my portable."

"You haven't much option" I told him. "I've already done it and don't propose to undo it." The change was remarkable. "'Course not old chap. You've done it and want paying. Why not?"

At this he sat down at the table and surveyed his steak and kidney pie. "Muum" he bawled, "you can come and cut the pie up now."

I couldn't believe it. His wife came back from the kitchen, leant over, and cut up the pie on his plate.

"Well put some sauce on it then" he commanded. And she did.

"Good darts match we had" he commented, dispelling any fears of mine that he'd had a stroke or something that stopped him using his hands. "Oh yes, nip next door and tell that bloke not to mow his lawn this afternoon. I want some sleep."

"Can't seem to sleep properly at night" he confided in me.

"Perhaps it's because you sleep in the afternoon" I said shortly. By now there was a fair picture on the 3000.

"How much is that little job going to cost?" he asked, his mouth full of hot pie and sauce. I quoted what I thought was a very reasonable figure (too reasonable to tell you), whereupon he stopped chewing and started to choke.

Recovering, he told me he'd phone his son who would call round to the shop and pay me. At the same time his wife reappeared and continued the conversation about his inability to sleep at night.

"He doesn't get his rest. Every hour he tells me to get up and open the window because he can't breathe properly, or close it because he's too cold."

It was all too much for me. I just had to rush home to tell Honey Bunch that Frankenstein's monster is alive and well.

# Crossed Lines

*Les Lawry-Johns*

SOME time ago I reported on the condition of Laura Lovitt's loose legs. On her dicey Decca of course. Also her collapsed frame which was restored to full working order after a quick visit to the bedroom – to plug in the iron as there isn't a plug point in the adjoining lounge, which surprised me.

I'm easily surprised, and my eyebrows seem to be permanently arched over something or the other, usually the latter but sometimes the former. I mustn't chatter on however or the editor may edit. Look what he did to my gravestone: he cut out "he he". If there's one thing that should be seen more on headstones it's more he he and less poor buggers. Never mind, one day he'll realise he's erasing some of the world's finest literary efforts, and without a passing thought at that.

Anyway, Laura had phoned to say that her set wasn't working, and I'd said I would call during the afternoon if she'd nothing on. So I nipped up to the bathroom for a quick shave, shower and shampoo while my wife looked on in amazement. This annoyed me for three reasons. First because she seemed to think it unusual for me to have a clean up. Now I'm not the scruffy type. It's just that I don't like wasting water and razor blades, so I normally clean up in the evening after the toil of the day. Secondly because she was also laughing. I haven't been too good lately and I've been under the doctor for a funny thing and the pills haven't done much good either. And finally because she wasn't annoyed.

"Give my love to Laura" she said. "After you've fixed her set I hope she'll find something worth looking at."

I ignored that remark. "I wonder whether she's still keen on that telephone chappie" I mused.

"Oh, you mean Eric. He's thirty years younger than you and he's coming here this afternoon to run an extension into the bedroom."

It was my turn to be amazed. "You Jezabel" I bawled with righteous indignation. "Planning to get me out of the way when that fancy fellow calls. No wonder you were laughing at me when I was having a shower."

"I wasn't laughing. It's just that I don't like to see dead horses being flogged. Laura said that Eric is an up and coming young man." It was all too much.

"Right. I'm going to nip down to Laura's to fix her set before you can say knife, then bring the knife back here to cut the telephone communications in the bud."

"All right love. Don't rush about though. You know it's bad for you."

It was under this cloud of torment and suspicion that I called to put Laura back into working order. Knowing these Decca hybrids fairly well, I'd packed into my case everything I thought I might need. Except one thing that is. The yellow van just had to be outside when I arrived.

## **The Dicey Decca**

There they were laughing and chatting away. Blockheads. What these women see in Eric escapes me. He must keep it hidden. I decided to give him a lesson in advanced technology. Instant diagnosis and immediate

remedy would really shake him. And give him an object lesson on the advantages of private enterprise over these top-heavy nationalised industries with their multilayer layers of layabouts all passing the buck to one another and getting nothing done. So I whipped the back off the Decca.

"Can you make it snappy Les?" asked Laura. "I've got a lot to do today."

The h.t. fuse had failed, and a test between the top cap of the PY500 and chassis revealed an almost dead short. "Nothing to it Laura. Just a shorted capacitor. I'll just check the suspects and stick another one in." So I confidently clipped the boost capacitor on the lower panel and connected the meter across it. No short.

"Bloody disc on the tranny" I thought out loud. The harmonic tuning disc ceramic was also blameless however, and it then dawned on me that there was a real possibility of the line output transformer having a short between its windings. This was the item I'd not brought along of course.

"Sorry Laura, I'll have to run it back to the shop to fit a new transformer. Should have it back by five o'clock with a bit of luck." Laura looked at Eric and then said it would be fine.

"Aren't you coming to our place this afternoon Eric," I asked.

"No. The new fellow Desmond's doing that one. Probably done it by now. Fast worker. We don't waste much time on this job – we carry all the gear we need with us you see."

So I shoved the Decca in the van and hot-footed it back to the shop. That little demonstration of 100% efficiency hadn't quite worked out as intended.

Back at the ranch, Honey Bunch was looking as bright as a new pin. The nice chappie had called, done the job and departed. "Quite a dishy young man" she said. "In and out before you could say stud." The torture continued without a pause. "You didn't have much luck with Laura then?"

## **Bush Rangers**

We seem to have quite a few of the little white Bush monochrome portables coming in – the ones fitted with the T16A chassis. The common failing is that the BF257 (BF337 or whatever) video output transistor has a high casualty rate, leading to a picture with an empty plastic look or no picture at all. The answer is to fit a new output transistor plus a heatsink – one of those nice round ones with fins is ideal. If you can't put your hands on a heatsink of the approved variety you can use the shell of a coaxial plug, clipping the side to make it fit if necessary. We refer to the metal type of plug of course, not to the part plastic ones, some imported examples of which don't even fit our standard coaxial sockets let alone a transistor . . .

## **8500 Focus Fault**

We often have trouble with the thinner, square type of thick-film focus unit used in the Thorn 8500 etc. chassis. So it came as no surprise when Mr. Piddlewell turned up again with his set. You will remember that we had a certain

amount of trouble with its start-up problems a little while ago. "Tube's gone" he announced flatly.

"No it hasn't" I announced, having had a look. "It's either the focus unit or the 100kΩ resistor on the tube base."

"I knew it was something to do with the tube" he said.

So we checked the 100kΩ resistor (in series with the focus electrode). Nothing wrong here. While next removing the focus unit screws I explained what happens when the thick-film track in the unit becomes practically open-circuit. I showed him the effect of having no focus voltage by removing the lead from the unit to the c.r.t. base panel. To my amazement the focus improved enormously – the picture was quite watchable, though we watched it for only a very short time.

To cover my confusion I switched the set off and proceeded to fit a new unit, mumbling something about the focus electrode borrowing some potential from the final anode for a short time. When the new unit was fitted I switched the set on and found the picture back in the grossly out of focus condition (at all settings of the control).

"It's better off without the bloody thing" said Mr. Piddellwell.

"That's silly" I said, "everyone knows you've got to have a high focus voltage with this type of tube."

"I don't. All I know is you've got to have a little adjustment to get good focus" said Mr. Piddellwell.

"How can we adjust something that's not there?" I argued reasonably. Having almost made my point I made the final diagnosis. "The e.h.t. rectifier unit must be up the creek."

"What's that got to do with the focus?" asked Mr. Piddellwell, sipping his coffee which No. 1 supplies for all potentially awkward customers.

"The focus unit receives its supply from the rectifier unit – this lead here" I said. "The rectifier's not providing sufficient output you see."

"How come it's better with none at all then?"

"Ah, that's the rub you see. If the focus electrode is not connected at all it floats, taking up a potential somewhere between that of the first and the final anode" I said.

"Sounds like a load of old bull to me" said Mr. Piddellwell unkindly.

"All right then, wait and see what it's like with a new rectifier." I was hoping I hadn't got one, but there it was on the shelf. In it went and I crossed my fingers, legs and eyes.

Perfect. "There you are you see. Faultless diagnosis."

"No it's not. You said it was the focus unit or that resistor thing on the tube base. I bet the thing you've just put in is dearer than those." Mr. Piddellwell's thoughts were becoming wonderously concentrated as he sorted out his priorities. "With the troubles I've had with this set lately I don't think I should pay anything at all."

"Don't then. Go somewhere else and see if they'll give you coffee while they sort out your clapped out old set."

"What do you mean, clapped out?" demanded Mr. Piddellwell indignantly.

"Well, the tube's going for a start."

"Right then. Now I'm not going to pay, and what's more you won't get your milk tomorrow morning."

The sooner the common market does away with our milkmen the better I say.

### Anne's Troubles

Anne is a local character who can't see why the world should be a different place from what it was fifty years or so ago. Her age is a secret, and she's a little woman with a loud

voice, very fond of a flutter on the horses. She goes into the bookies and puts sixpence each way on this horse and sixpence each way on that. The bookies don't hesitate to accept her money, even though she moans about two bob being a lot to pay out. Anyway, she popped into tell me that her sound had gone off.

"I'll be up this afternoon, Anne."

"You can't come this afternoon mate, I'm having my hair permed. I'll borrow a set from the pub tonight. You can come tomorrow. Make it two o'clock. Don't be late: I go down to the bookies at half past."

So next afternoon at precisely two o'clock we pulled up outside. The set needed a new PCL82 and a couple of resistors.

"I suppose you're glad of the work, the way things are" said Anne.

"Yes thank you Anne."

"That's all right mate. Now what do I owe you?"

"Seventy five pence please Anne."

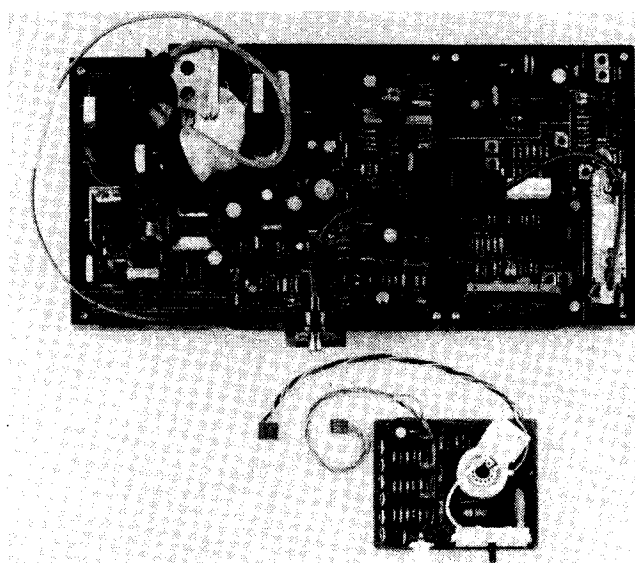
"Here's a pound. Keep the change – I believe in paying a man his worth. You can put the plug back on the set I borrowed from the pub before you go, it'll save them having to do it later."

### Test Report

We've just taken in our first batch of Fidelity CTV14R colour sets – and very nice little sets they are. British made and fitted with a 14in. Toshiba black-stripe tube. The picture strikes us as being exceptionally bright and well defined.

The hand-held infra-red remote control unit changes the six selected channels positively, and the off button switches the set off when depressed for a few seconds. Removal of the rear cover (sensible screws for a change) exposes the well laid out horizontal panel, with everything easy to get at and the presets clearly marked. If servicing is required, it looks as if this is not going to present any problems. One of the sets had a tendency to jitter vertically, but only when the tuning cover was up to close the a.f.c. switch. The a.f.c. coil was clearly marked on the front right-hand side, and a slight turn of the core of this instantly cleared the instability.

Full marks Fidelity. This set looks a winner, and has a very reasonable price.



The main panel and c.r.t. base panel used in the Fidelity CTV14R 14in. colour transportable. The low component count and neat layout should make any servicing required easy.

A white "AFN" symbol is superimposed from time to time, presumably to prevent unauthorised copying (similar to the Italian RAI practice). The only vision identification is at the start of programmes (see accompanying photo), though there are audio identifications – "you're watching AFN, Shape" – during many breaks between programmes.

Alan uses a Grundig TV set which switches automatically between the 4.5/5.5MHz sound signals

(Grundig have dual-standard sound i.f. modules for systems B/M and B/I). He mentions that the pull-in range of the TDA1170 field timebase i.c. used in his set is such that the field frequency control can be set for perfect sync with both 50 and 60Hz signals. With the height control set for a 625-line picture however the height will be about 20% short on 525-lines. To overcome this problem it's necessary to reduce the resistance between pin 7 of the i.c. and chassis.

# Ridley Relents

*Les Lawry-Johns*

RIDLEY'S been a valued customer of mine for many years, and a friend to be even more valued when the wind has blown against us which, fingers crossed, it hasn't done for a considerable time. Throughout the colour boom Ridley stuck to his monochrome set, saying that colour had no fascination for him at all. Anyway, I'd just sold a 22in. Pye colour set (K30 chassis) to a chap who'd come to buy a pair of headphones when Ridley came in.

"You'll never guess what I want" he said.

"I think," I said carefully, "you've decided it's about time you had a colour set. Why?"

"I was out at Bob's place last night and he put his set on to catch the golf highlights and you know, Leslie, it does look better in colour after all. So I thought I'd pop in and give old Les a shock, and here I am."

"You certainly have Ridley. If you can do a U-turn anything can happen."

"Well what do you suggest? It's got to be British of course."

"Of course. What about a nice 22in. Pye set like the one that chap's just chosen – with a bit of help of course."

"Is it British? I thought they were part of that Dutch lot."

"Well yes. European co-operation and all that. The tube's French, but we'll insure it for four years so you've nothing to worry about. Have a look and see what you think" I said, busy unpacking one from its box. Up on the bench the picture appeared in a matter of seconds and Ridley was clearly impressed with the clarity of the picture and sound.

So we piled it into the van and installed it in its appointed place in Ridley's lounge. Switching on didn't produce the fine picture we expected however. It immediately started to trip. Hrrump bonk it went.

"Oh dear" said Ridley. "It doesn't like living here".

"Course it does" I said. "Probably didn't like the journey. Jet lag or something."

"That's just fine" said Ridley. "Can't travel half a mile before it starts huffing and puffing. My old set could travel to Cornwall and back without turning a hair."

I knew I had to do something, so I took the back off and stared at the large panel. Employing the latest of servicing techniques, I gave it a sharp tap with the end of the screwdriver, somewhere around the centre section. The set stopped huffing and puffing, produced a perfect picture and talked to us nicely enough. "There you are. You just have to show them who's boss." I tapped it some more, thinking that the something or other that was playing about would play about some more, but it didn't. The set continued to behave impeccably, which was just as well since I've not yet become an expert on the K30.

If Ridley had any doubts he kept them well hidden and

seemed pleased with the performance (the set's, not mine). So another sale was made and another triumph was notched up by my screwdriver.

## More Puffing

Back at the ranch Honey Bunch told me that another old friend had phoned to say that his set was playing about. So I rang him to ask what was up.

"Hallo Len. What are you moaning about now?"

"It's this set of mine Les. It comes on and then goes hrrump and goes off and won't come on again till I press the red button at the back. It'll go for some time and then starts to bugger about all over again. You know it's too bloody big to put in the car, so you'll have to stir yourself and come down. Oh yes, and bring one of those colour portables with you. Dot wants one for the kitchen so she doesn't have to watch football."

So we prepared to do battle with Len's 26in. Ferguson (3500 chassis). Pile in everything just in case, including a spare power panel, and don't forget the portable and the battery for the remote control unit. Off we set, wondering whether the portable would show symptoms of jet lag when we arrived.

First we demonstrated the portable, which performed perfectly. So Dot (Len's wife) took it off to the kitchen, proclaiming that Len wasn't going to watch it even if the big set did huff and puff.

The 3500 wouldn't play up when we wanted it to. So we switched it off and tried again after taking some liquid refreshment. This time it did play about, and as the red button cut out seemed to restore normal operation we changed this first. No difference of course.

As there was plenty of voltage on the body of the chopper transistor when the set went off we turned our attention to the 30V line. There was only 30V instead of about 45V at the 1,000µF reservoir capacitor, i.e. at the input to the 30V regulator, but the voltage increased to normal when we prodded the capacitor, the set coming to life again. The electrolytic usually dries up, preventing the set working altogether, but on this occasion there seemed to be a poor leadout contact. A replacement capacitor cured the huffing and puffing – presumably the act of pressing the red button had momentarily interrupted the supply and sealed the poor contact.

## I've been Struck

We've had some pretty severe storms of late, so it was no surprise when Mr. Allen phoned to say he'd been struck by lightning. Not really him you understand but his set, another large Ferguson – this time with the more up-to-date 9800 chassis.

When I arrived he pointed to a heavy chrome ornament. "That was on top of the cabinet. Must have attracted the lightning to the set" he proclaimed. I've found it best over the years not to disagree unless it's absolutely necessary, since I don't know all that much about these

things. So I nodded my head and then shook it in sympathy. "Funny thing lightning. Scares me stiff. Never know what it's going to get up to next." "It struck my umbrella once" said Mr. Allen. "There was nothing left but the wood. Made me feel quite funny at the time." I tut-tutted as I removed the set's rear cover.

It seemed to be perfectly all right until I took a closer look at the upper left mains input subpanel. A diode here was in two halves, while a resistor was a small, charred mass. I thought at first that the diode was the one in series with the thyristor h.t. rectifier/regulator, and then realised that this is on the lower power board. The damaged diode was the first one (W810) in the start-up circuit, the resistor being the following 470Ω one (R814). The path appeared to have been via W810, C810, R814 and VT810, which appeared only as three small wires with no transistor body to contain them.

A small voice inside my head told me not to muck about with the set there and then, but to take it back to the shop as it was going to be a long story. The voice was right, because when I ignored it and replaced the damaged components the set immediately began to trip like mad.

So we hauled the monster into the van and subsequently spent several unhappy hours on the bench. A replacement power panel was eventually fitted. This stabilised the supply lines (the line output transistor had been replaced earlier in the proceedings, along with quite a few associated components which had been dealt a deadly blow). We then had a raster but no signals, and naturally thought that the tuner must have been the first casualty. In the event, the tuner seemed to be about the only item completely unharmed. This is not quite true of course, but we had to replace two i.c.s on the signals board before normal reception was restored, suggesting that there'd been a sudden and drastic increase in the supply voltage.

Mr. Allen also appeared to have been struck by lightning when I presented him with the bill. When he recovered, he told me that lots of funny things had happened up and down his road as a result of the storm – and not only to TV sets. Cookers wouldn't cook, freezers wouldn't freeze, and one house will have to be completely rewired because the wiring vanished, leaving only trails of dust where the cables had been.

"All the copper just vapourised – puff" said Mr. Allen impressively.

"You were lucky it only got to your TV set then Mr. Allen, very lucky."

### **Who Needs Friends?**

You may recall that one of our customers lives in a back-to-front house in a quiet and select area. He's a bookie or turf accountant rather, and seems to travel around the world a lot. So we go for some time without hearing from him. He turned up the other day however. Strode in demanding to see the books and claiming to be the Vatman – to the consternation of a couple of customers who were in the shop at the time. I explained to them that he wasn't really an angry Vatman but only a friend having his little joke. This seemed to amuse them as one was actually a Customs and Excise man on his day off.

It appeared that his old Dynatron was giving trouble again, so I promised to visit him later. For his part he promised to remove the twenty thousand screws that hold the back on before I arrived. The set's a CTV25, with a VCR in the top, the chassis being a 733 or 743 (I can never remember, they all look like the 725 to me). It has the vertical panels and centre power resistor and fuse in the h.t.

line, and it appeared that the 56Ω section of the power resistor was open-circuit. There was a fairly low resistance reading at the end of this that feeds the line timebase, so suspicion centred on the line output transistor which proved to be short-circuit.

After a struggle we removed the timebase panel completely and then attempted to remove the transistor. Attempted is the operative word. The screws were stuck fast and no amount of heating, twisting or turning would shift them, and time was slipping by. At last I gave up and took the panel back to the shop (not having the courage to remove the set itself).

On the bench the comedy continued, until the screws were just bits of metal with holes in the top and there seemed no possibility of cutting a slot with a hacksaw. At this point son-in-law Dougie appeared.

"No problem" said Dougie, who although Greek claims to have mastery over every language including ancient Chinese. "Wait while I get my socket set."

He returned with a tool box and his brother Soffie. With a socket under each screw to support the panel, Soffie held a screwdriver (standard blade) on the screw and Dougie dealt it several almighty blows with a hammer to cut a slot in the top. The process was repeated, before my horrified but fascinated gaze, on the second screw. The screws then offered no further resistance, and the transistor was changed in a trice.

As I soldered the base and emitter contacts, my eyes were attracted to the myriad of fine lines fanning out from the source of the operation. Many tracks were in need of repair, and the panel presented a somewhat different appearance when it was at last ready for operation.

"Thanks Doug. I wouldn't have thought of doing that myself. Glad you popped in."

"No problem" said Doug.

In fact the set worked quite well when the panel was refitted and the power resistor was replaced. Once I'd located the remote control unit that is.

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### **STATION OPENINGS**

The following relay transmitters are now in operation:

**Backbarrow** (South Cumbria) TV4 (future) ch. 50, BBC-1 ch. 57, Granada Television ch. 60, BBC-2 ch. 63.

**Beer** (Devon) BBC-1 ch. 55, Westward Television/Television South West ch. 59, BBC-2 ch. 62, TV4 (future) ch. 65.

**Belper** (Derbyshire) BBC-2 ch. 56, TV4 (future) ch. 62, BBC-1 ch. 66, ATV ch. 68.

**Collafirth Hill** (Shetlands) Grampian Television ch. 41, BBC-2 ch. 44, TV4 (future) ch. 47, BBC-1 ch. 51.

**Fetlar** (Shetlands) BBC-1 ch. 40, Grampian Television ch. 43, BBC-2 ch. 46, TV4 (future) ch. 50.

**Fintry** (Scotland) Scottish Television ch. 24, BBC-2 ch. 27, TV4 (future) ch. 31, BBC-1 ch. 34.

**Fishguard** (Dyfed) Sianel 4 Cymru (future) ch. 54, BBC-Wales ch. 58, HTV Wales ch. 61, BBC-2 ch. 64.

**Kirkfieldbank** (near Lanark) TV4 (future) ch. 53, BBC-1 ch. 57, Scottish Television ch. 60, BBC-2 ch. 63.

**Methven** (near Perth) BBC-1 ch. 22, Grampian Television ch. 25, BBC-2 ch. 28, TV4 (future) ch. 32.

**Millbrook** (Southampton) Southern Television/Television South ch. 41, BBC-2 ch. 44, TV4 (future) ch. 47, BBC-1 ch. 51.

**Penny Bridge** (South Cumbria) Granada Television ch. 23, BBC-2 ch. 26, TV4 (future) ch. 29, BBC-1 ch. 33.

**Strathallan** (Scotland) BBC-1 ch. 39, TV4 (future) ch. 42,

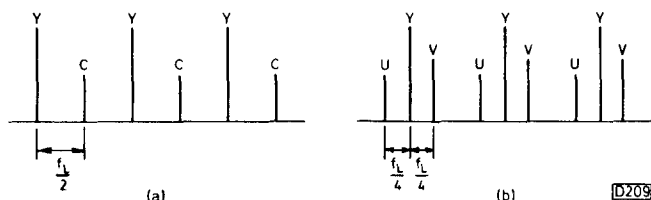


Fig. 3: Comparison between NTSC (a) and PAL (b) video signal spectra in the vicinity of the colour subcarrier.

Now you'll probably be asking why not apply the idea to the PAL system to get an even better picture? The answer unfortunately is that it won't work, not easily anyway. The problem is that when Dr. W. Bruch developed PAL he put a quarter-line offset on the subcarrier frequency (see Fig. 3). This means that the  $180^\circ$  relationship between the

luminance and chrominance signals doesn't hold, making life difficult to say the least. You can still do this type of filtering, and in fact an allied technique is used in the latest digital standards converter units, but you need at least one frame in store and a lot of computing power, which is not economical for the domestic telly! TV is going digital however, and memory is dropping in price, so who knows what may be possible in a few years' time?

Well that about wraps it up for now. All I've got to do is to think up a subject for my next report! Maybe you'd like to make some suggestions on what you'd like to know about the US TV scene? Just drop a line, care of the editor.

Finally a tip for drinkers who are "Hitch Hicker" fans: the pangalactic gargleblaster is alive and well and living in the USA under the name of Long Island Iced Tea... Freeow!

# Desolate Dan

## *Les Lawry-Johns*

WE get a strange assortment of customers here. One of the strangest is probably Dan, whose vocation in life is the cleaning of outside pub toilets – which is why he’s known as Dan the lavatory man. During his off-duty periods he goes around with an odd character called No Nose, who pushes a barrow around for a living. What’s in the barrow no one seems to know, since he keeps it covered up. The two are probably friends because No Nose has difficulty smelling anything, and if there’s one thing Dan has it’s a smell. The principle is akin to working in a fish and chip shop – the smell follows you home. The aroma around Dan is a trifle offensive unfortunately. Even the cat, tolerant though she is about most things, beats a hasty retreat whenever Dan comes in. I can’t beat a hasty retreat, so I keep a fixed smile on my face while I shake my head at whatever he asks for in the hope that he’ll beat it quicker than if I nod. Honey Bunch does her disappearing act even quicker than usual when Dan is about.

Anyway, Dan brought his old Bush CTV184 (A823 chassis) in the other day with the complaint that the sound was o.k. but there was no picture.

"I've a couple of jobs to do," said Dan, "so I'll be back in about half an hour. You might have found out what's wrong by then".

"I might" I agreed, "but on the other hand I might not. But do call back. We're always pleased to see you Dan."

So off he went to slosh his toilets around a bit or whatever it is he does with them, and I turned to the set to check whether the top h.t. fuse was intact. It was, and a quick check at the tube base socket revealed that the first anode voltages were also present. The cathode voltages were a bit high, so attention was turned to the RGB output transistors which were found to be without any forward base bias. The preceding driver transistors had a negative voltage at their bases.

"Clamp pulses" I muttered, as though I knew what I was on about. There's a feedback clamp system you see, the clamp pulses coming from the line output transformer. Oh dear, all this complication. I looked at the circuit for a bit of help. Ah yes, the pulses come via the power supply panel. Let's take a look here. Two diodes near the h.t. smoothing resistors provide pulse clipping, so the bench lamp was directed on them. Glory be, one was away from its tag. Checks proved that the diodes were in order, so we soldered

the diode back on and the voltages returned to normal.

Which is more than the picture did. It was plain red. The green and blue tube base voltages were right, so we thought we'd check the tube's emission. Red good, nothing on the blue, nothing on the green. Patient reactivation brought them up to scratch, but it took a time and Dan's return would not be delayed much longer. Now that the emission of the three guns was about equal, we could set up the picture for natural colours. I was quite pleased with the result.

Dan came back, accompanied by No Nose. I turned the set round so that Dan could see the results of my good work. The reaction was not what I expected.

"What have you done to my picture? It was a lovely red, now it looks like anyone else's."

"It looks all right to me" said No Nose.

"Yes, but you didn't see it the way it was" said Dan. "It was a sort of cosy colour. Made you feel comfortable just looking at it. Now it looks . . . ordinary."

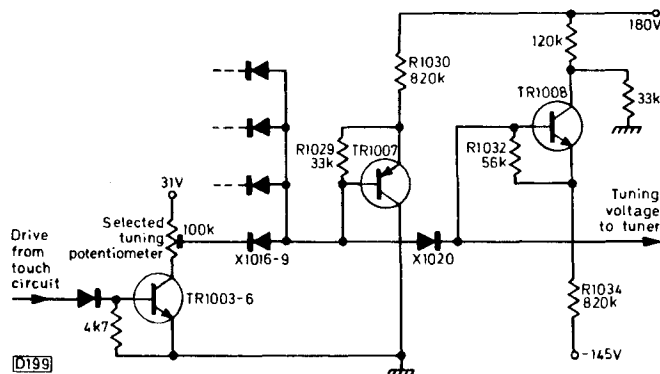
"Don't worry Dan" I said. "It'll soon be all nice and red again. If not this week then next, or possibly next month. It'll go back to red sooner or later, and then you'll be happy and it'll be worth waiting for."

Dan looked dubious, but I had to get rid of him somehow as it was getting a bit thick and I didn't care to think what other customers would say when they came in and sniffed the local air.

So Dan and No Nose carried the set out, leaving us to coax some breeze through the shop.

### Teleton Touch Tuner

We then turned our attention to a Teleton set which had been waiting for us to summon up enough patience to find



*Fig. 1: Tuning voltage selection arrangement used in the Teleton Model C18BS.*



out why the tuner wasn't tuning. A touch-tuner type, Model C18BS. We located the lead which should have carried the tuning voltage to the varicap tuner, but there was nothing there at all. Over to the selectors. The situation that confronted us here was as follows: about 30V at the supply end of the tuning potentiometers, but no tuning voltage output to the tuner unit – if anything there was a slight negative voltage, which was rather upsetting. We then received a distinct h.t. kick on the hand, which we'd carelessly rested on the end of the panel. Fancy that we thought, and decided to check the voltage. 180V. It feeds a couple of resistors, one of which (R1030) has the fairly high value of 820k. It seemed reasonable to see what the voltage at the other end of this resistor was. Nothing, because the resistor was open-circuit. Correct tuning was restored on fitting a replacement.

Fancy that we thought, Mrs. Crabbe will be pleased.

We then took a closer look at the circuit (see Fig. 1) to see what had been going on. As usual, there's an isolating diode in series with the slider of each of the tuning potentiometers. The idea is that only the diode connected to the selected potentiometer conducts, the others being reverse biased by the 30V supply. For the selected diode to be held conductive, there has to be a hold-on current path. This is provided by TR1007 and R1030, the transistor acting as a shunt stabiliser to hold the voltage at the junction of R1029/R1030 constant at some 1.2V above the voltage at the slider of the selected tuning potentiometer. So with R1030 open-circuit, the diode in series with the slider of the selected potentiometer won't conduct and there will be no tuning voltage output.

What does the rest of the circuit do? X1020 provides temperature compensation for X1016-9 (whichever is conductive). It too requires a hold-on current path, which this time is provided by TR1008 and R1034. The fact that the emitter of TR1008 is returned to a -145V rail explains the slight negative voltage we found on the tuning line.

## And Then

Our peace was shattered by the arrival of Mr. Bore-Crashing, who claims to be an authority on all matters electrical. We'd crossed swords over his hi-fi equipment in the past, and he still claims that if he records a cassette here and sends it to a relative in the USA it will play at a different speed due to their 60Hz mains supply. This time he brought in his Ferguson colour receiver (Thorn 9600 chassis) and announced that the h.t. was low. As he was busy, he didn't feel like tracing the circuit through to find out where the h.t. was being dropped. I've learnt not to ask questions of him, because you get only a load of "I think" and "I know" but no description of the fault. So I plugged the thing in and connected it to an aerial. A picture appeared, with a gap at each side and a bit of a kink right down the centre.

"There you are" said Mr. Bore. "Not enough h.t. to fill the picture out. Now tell me I'm wrong!"

"You're wrong" I said, having had a similar case the previous week. "Your E-W modulator isn't modulating."

"There you are" he said, "it's not modulating because it's not got enough h.t. to modulate it." Too late, I realised I'd given him a new term to play with. He caught sight of Honey Bunch mucking about with the window display.

"My modulator's not working properly" he confided to her.

"You poor man" she replied, "I do hope it gets better soon."

So he gave that up and returned to watch me shining a

light into the right side of the main panel to see whether W810 – one of the modulator diodes – was feeling sorry for itself. It was a bit charred, and came out in pieces. It's a BY298, but I generally fit a BYX71 as a replacement since these seem to last longer and anyway I keep these and BY223s in stock for use in this position.

"Ah, the h.t. rectifier" proclaimed Mr. Bore.

"You could call it that, but it isn't" I said wearily, not wishing to go into the niceties of 110° scanning as I lazily soldered the replacement on the underside of the panel and checked with an ohmmeter to see that I'd got it the right way round.

"We'll soon see if it works" said the impossible Mr. Bore.

It did, for about a minute or so. The picture then sort of shuddered in and out and a cloud of grey smoke came from the approximate area of the tripler. Triplers don't give off grey smoke however, and they don't smell like that. It was like what you get from a hybrid ITT set when the mains filter capacitor starts steaming off whilst leaving the set working, thereby spreading consternation throughout the household (you know what I mean – those yellow ones). So it appeared to be a defective capacitor, and the circuit suggested that it might be C815 (1μF) which provides filtering between the driver transistor and the two modulator diodes. It didn't look an easy matter to get at it, so I suggested to Mr. Bore that he might like to call back later.

He seemed to hesitate, as though loath to leave the set in the hands of an incompetent idiot who couldn't even replace an h.t. rectifier without blowing up something else, but he eventually wandered off. So I called for coffee and had to make it myself as Honey Bunch was busy playing with a radio which was getting CB, with an interesting conversation about a Teddy Bear or something.

When I'd got up enough courage to tackle the suspect, which was hiding away at the front of the scan panel, I had to remove the tripler to reach it. I then found that I didn't have a 1μF capacitor with the correct voltage rating, so I ended up with two 2μF capacitors in series. This seemed to work all right, and I'd hardly replaced the back when the horror returned. Not the smoke or anything wrong with the set, but Mr. Bore himself.

"I thought I'd better not stay away too long in case you might need a bit of help."

## Repeat Performance

Hardly had he gone than a Rank Z718 was brought in with a no-go symptom. The h.t. feed was o.k., but something was preventing the line output stage from working. Unhooking the top retainers enabled us to get at the front of the right side panel, where just for fun we checked the same circuit (the EW modulator – not quite the same, but you know what I mean). The two diodes here are 5D5 and 5D6. 5D6 was faulty, and turned out to be an SKE something or other. Anyway we stuck in a BYX71, which is what the circuit actually said, and order was restored. Funny how things seem to go in cycles, isn't it?

If you get one Thorn 1500 in with poor sync for example, you can bet your life that there'll be at least two others close behind waiting to have their 47kΩ sync separator screen grid feed resistors replaced.

We've also had a run of solid-state GEC colour sets in recently (C2100 series), all with line output stage trouble where the 40V rectifier diode D601 (fed from a winding on the line output transformer) goes short-circuit. In goes another BYX71, underneath instead of on top. I wonder what it'll be next?



# ***The Flying Scotsman***

## *Les Lawry-Johns*

ABOUT a month ago we sold a Fidelity colour portable (Model CTV14R) to one of our regular customers who frequents our local pub. This means that we see him pretty regularly. He was delighted with his new colour portable, being able to lay in bed with the remote control unit and thus able to switch the set off without getting up as his eyes grew heavy. The other day he popped in to say that it had developed a mind of its own however. Just as he got interested in an ITV programme, the set would change to BBC-1 and wouldn't go to any other setting no matter how many times he pressed the channel change button.

"Bring it in Jock" we advised him. "We have ways of making them change their minds."

Jock McStrap is a fast mover, and while I was pondering on the possibilities he had gone and come back again. He plonked the set on the counter and launched into his theory.

“Say I’ve got it on channel 3, like this. It’ll be all right for some time, then the channel 1 indicator will start to glow and get brighter and then clonk, it changes to 1 and the channel 3 light goes out.” Without a pause he continued “I think it’s a little something touching where it shouldn’t when it gets warm you see . . . Whatever it is, it won’t take you a minute to find so I’ll call back later.”

"O.k. Jock, we'll do our best to make it behave itself."

So off went Mr. McStrap, leaving us to consider the situation and decide on a course of action. He hadn't brought the remote control unit with him, so we watched for the fault to develop and it did. As a matter of fact the channel 1 LED (see Fig. 1) glowed faintly from switch on, even though another channel had been selected and the appropriate LED lit up fully. Within a short time the channel 1 indicator got brighter and the set switched to channel 1, just as Jock said it did. Like a flash I reached a decision – which turned out to be the wrong one of course. "It must be a faulty chip – the ML232B channel selector" I thought.

Bearing in mind what sort of a device it is, I took all the usual precautions, earthing everything to make sure that no static charges could ruin the new chip. We then set about removing the front control panel where the chip lives. After

a bit of swearing and cussing at everything and everybody, the new chip was installed and we were ready for testing. The channel 1 LED still glowed faintly when another channel was selected, so we knew we'd dropped yet another clanger.

I then did what I should have done in the first place and studied the circuit. Transistor TR3 is linked to the channel 1 indicator, and it seemed likely that if slightly leaky it could be responsible for the symptoms. A new BC157 was fitted and proved to be the answer – to the defective channel change that is. (Note that the provisional circuit shows the type incorrectly as BC548, which is an npn device: the full manual gives the correct pnp type, BC157 or BC557.) Having refitted the panel and wrapped the set up we felt satisfied that the job was done. Jock came back and satisfied himself that the channels changed as they should do.

"Was it a wee something touching, Lawry?"

"Leaking, Jock. It was a wee leak after all."

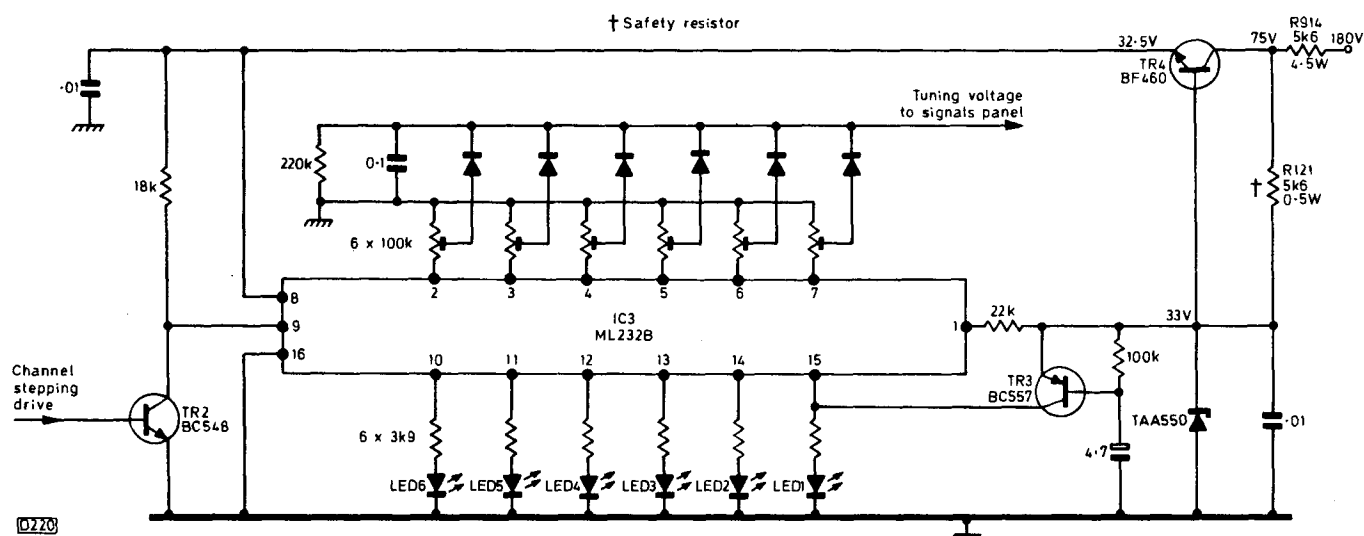
So off went Jock, only to return next day.

"It's doing it again Lawry, but it's now worse. It won't even stay on channel 1."

My heart sank. What now?

Investigation proved that over a period all signals were lost and that the tuning voltage to the tuner fell to zero intermittently. The supply to the TAA550 30V stabiliser on the front panel remained steady, and seemed to be present at the ML232B i.e., though it was difficult to tell because the fault was coming and going rapidly. Like the fool I am I again accused the chip, and went through the rigmarole of changing it – only to find that the fault was still present. I then found that movement of the panel prompted or cleared the fault, suggesting that we had either a poor connection or perhaps a crack somewhere. I eventually found the crack – through three tracks – though it was almost too fine to see. It had apparently occurred when I'd refitted the panel on the first occasion and had difficulty aligning it with the fixing holes. Having repaired the panel we put the set on a prolonged soak test and experienced no further trouble.

We've sold dozens of these nice little sets, and this was



*Fig. 1: Channel selection circuit, Fidelity Model CTV14R.*

the first bit of trouble we've had, so we mustn't complain. Jock seemed happy enough anyway, and his friend Chip Fryer has come in to buy one as a present for his wife. All quiet on that front.

### The Waltham W125

I'd sold this 24in. Waltham monochrome set some five years ago to an elderly lady who'd brought it back and made me an offer I couldn't refuse: if she had it back before evening, I could live. This precluded sending off for spares, and it was an unfortunate fact that the e.h.t. overwinding on the line output transformer was running warm even with the stick rectifier disconnected. The spark at the overwinding output was less intense than the one at the top cap of the PL504 line output valve, so whether I liked it or not the transformer was faulty and my time was running out.

I searched through my stock of transformers, but I knew I didn't have one. The only alternative was to remove the faulty winding and fit a tripler, or to strip down the transformer and fit another overwinding. Being a lazy cove I chose to cut away the faulty winding and fit a tripler – using one of the Thorn five-stick replacements with a short connection to the PL504 anode connection point on the transformer (with a PP3 battery stud to fit to the tripler). As expected, the resultant picture was lacking in width: the correct tuning capacitor turned out to be a 35pF 8kV working disc type, from the anode connection to chassis. This low value was in fact a surprise, as I'd expected to use a value more like 100pF – but the width was then excessive.

So we made the tripler secure and checked the rest of the set before returning it to the old dear. It was late afternoon and already dark when I arrived at her house. The full moon shone brightly in the clear sky, and an aircraft had left a

vapour trail that seemed to skirt around it. "Oh look" said the old girl, "if he hadn't seen it in time he'd have flown straight into it." Honest.

### Late Night Final

I arrived back at the shop expecting it to be closed. The lights were on however and there was a car outside. A lady had brought in a large, 26in. ITT set (FT110 chassis) with the help of her son and daughter. We'd last repaired it about a year ago, when her husband had brought it in. This time he had elected to stay at home watching the portable rather than risk having to listen to me moaning about the difficulty of diagnosing the cause of the trip circuit tripping. And tripping it was. Not the full-bodied hrrump-bonk some sets produce, but more a sort of soft tick tick.

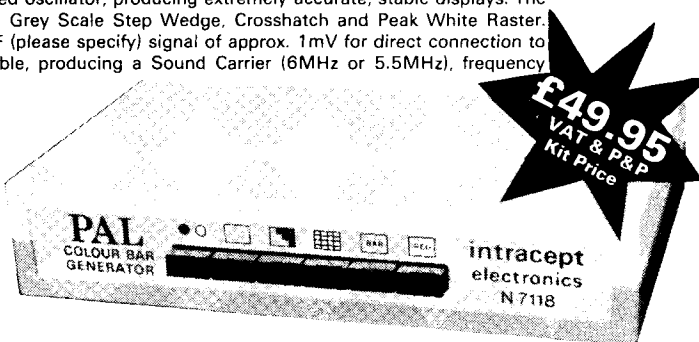
I disconnected the tripler as a start. That didn't make any difference, so I set off on a wild goose chase trying to find a shorted diode. "Perhaps it's the transformer" said Honey Bunch helpfully, thinking of the long line of transformer failures we've had of late. This jolted me into thinking a little more rationally: I hadn't checked the line output transistor, which turned out to be dead short collector-to-emitter. We removed the BU208 with some difficulty, and with much cussing and blinding about accessibility fitted a new one together with two new 0.005µF (to make up 0.01µF) pulse type flyback tuning capacitors just in case.

Knowing my luck when performing before an audience, I switched on with fingers, legs and eyes crossed. It worked, and worked well enough apart from a little misconvergence on the left-hand side. This seems to be a common feature of these sets however, and by this time it was getting late and the family were only to pleased to cart the set off back to dad.

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# How to be Tetchy

Les Lawry-Johns

I AM one of the most pleasant of people – easy to get along with, understanding and tolerant, helpful and constructive, with never a nasty thought in my head except on rare occasions. It's worrying therefore to find these occasions becoming less rare and my tolerance increasingly strained. I'm aware that I'm not as young as I once was, and that to the above list could perhaps be added dodderiness. But I don't somehow think that age has too much to do with this subtle change of character, which has me contemplating bashing people over the head with a blunt instrument and then dancing at their funerals.

You see what I mean. It is rather worrying – especially since I don't seem to worry about it all that much. Our dog Ben and I seem to share one trait in common: we snap at people even though they appear to be kindly souls, just in case they're not I suppose. Take the other day for example.

## Plug Play

A chap brought his set in for repair just as we were closing. I had a quick look, but as it was a case of intermittent field collapse and it wouldn't collapse for me I suggested that he leave it and take one of our loan sets home with him so that his wife wouldn't miss Crossroads and he the football.

When he came back the following day to collect his own set he brought ours back and dumped it down. He surveyed it for a moment and then came out with "did it have a plug on it when I took it?" This annoyed me and I snapped "yes it did and you're not having that one." He'd had his set repaired at a very reasonable price, he'd been lent a set for nothing, and here he was scared stiff or loosing a plug, even though a moment's thought would have confirmed that it did have a plug when he took it away the night before. Only a little thing, but it did get me going for a moment.

## Enter Mr. Doubleday

We hadn't seen Mr. Doubleday for quite some time. He showed up the other day and needed a bit of help in getting the big Ultra colour set out of the back of his estate car. "This is a 26in. set" he panted quite unnecessarily. "It belongs to my neighbour, my neighbour." To cut the story short and avoid all the repetition to which Mr. Doubleday is prone, it seems that the neighbours were watching the set when it suddenly went off. And now here it was waiting for the little thing that would start it up again.

Quite unsuspectingly, I took the back off the Thorn 3500 and immediately started to check the usual things in the power supply before applying the juice – the rectifier diodes, the cut-out, etc. These were all intact, so we plugged the set in. The degaussing buzz occurred and the tube heaters lit. There was a hefty h.t. present at the body of the chopper transistor (see Fig. 1) and the 30V supply was present. There was no 60V h.t. supply at the centre fuse (F603) however, i.e. no output from the chopper. When the meter was applied to the end, right-side tag of the dropper resistor to see whether the 12V supply to the chopper driver transistor was present, we found only about 3V.

This was obviously a starting point. We lifted up the power unit to start checking – and found the timebase plug

hanging free. Incredibly, I didn't immediately notice that all the other plugs and leads from the field and line timebase panels were also hanging free – I suppose because I was concentrating on the power supply panel. Taking this out (having plugged the timebase plug in and got no results) we followed up the low voltage. Was the chopper driver transistor short-circuit or permanently on? Check the drive from the monostable circuit. Whilst we were attending to this our eyes were attracted to R620 in the monostable circuit. The resistor looked a bit sick, and measured only a couple of hundred ohms instead of 2.7k $\Omega$ . So we replaced it and on putting the power supply panel back we found we had the correct 12V at the end of the dropper and 60V at the centre fuse. So the power supply and the line oscillator were working (the trigger pulses for the monostable come from the line oscillator). There was no sign of line output stage operation however, and no voltage across R907 in the beam limiter circuit (this resistor is between the line output stage earth line and the rest of the chassis).

It was then that I turned to the line output stage and found all the leads off and the tripler disconnected. "Someone's been at this" I growled at Mr. Doubleday. "Oh no, it just went off, went off" he protested. By this time I'd removed the line timebase panel and looked at it a little more closely. The R2008 line output transistor was completely disconnected, leads were off the two transformers and, looking just a bit more closely, the line driver transistor was seen to be missing along with several capacitors and diodes.

"Look at this" I bawled, making the cat beat a hasty retreat.

"I don't understand these things, these things" said Mr. Doubleday.

"Perhaps you don't, but see all these leads hanging free and these empty spaces. It means someone's been here before us, and a bloody fine mess they've made of it too. Your neighbours are having you on. Sorry Mr. Doubleday, but I don't want the job putting this lot right."

"They wouldn't mind spending a tenner on it, a tenner on it" bumbled Mr. D. "I shouldn't think it would cost much more than that."

I finally lost my cool at this and slapped the bits together and the back on. Before he could say another word, I'd the set outside and in the back of his car. "Cheerio Mr. Doubleday, it's been nice knowing you, knowing you."

When I got back into the shop Honey Bunch was giving me that look. "I don't know what's got into you lately. Mr. Doubleday was quite upset when he left. You won't have any customers left if you carry on like this, carry on like this."

"\*\*\*\*\*" I said nastily.

## They'll Never Believe Me

Hardly had we had time to drink a cup of coffee than a young fellow struggled in with another 3500 – a 22in. Ferguson set this time. "What's wrong?" I asked carefully.

"We were watching it and it suddenly went off."

I took the back off and carefully checked all the plugs and sockets. They were all connected and hadn't been disturbed, so we started the routine. 30V line o.k. 240V at

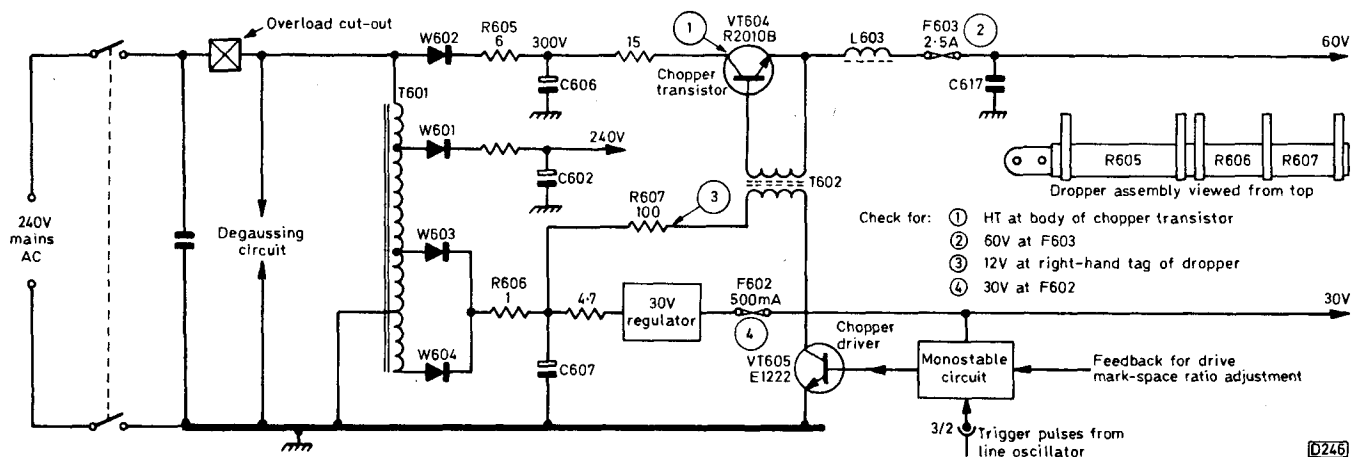


Fig. 1: Quick checks on the Thorn 3000/3500 chassis power supply module (simplified circuit). H.T. at the body of the chopper transistor but no 60V supply at F603 means that either the fuse or the transistor is open-circuit or the transistor is without drive. If the fuse and chopper transistor are o.k., check the 12V supply to the driver transistor, the 30V supply to the monostable circuit etc., and for the presence of trigger pulses at connector 3/2 and drive to VT605.

the body of the chopper transistor, nothing at the 60V fuse. Also nothing at the extreme right-hand tag of the dropper resistor though there was 45V at the next tag. Like a fool I started to try to find out what was pulling the voltage down and had got to the point of taking out the power pack when a voice inside my head said "why isn't the dropper section hot if you think it's overloaded?" I suppose I was still thinking of the previous disaster. So I checked the continuity of the 100Ω section with the ohmmeter and of course it was open-circuit.

Back went the power unit and in went a new dropper section. On went the set and up came a pink picture (no green). A quick check revealed that there was no supply to the tube's green first anode, due as usual to leakage in the beam switch. This was soon dealt with and everything seemed fine except for an intermittent flash of bright blue. Moving the thick-film video load unit proved that it was at fault since the picture remained bright blue now that the intermittent open-circuit had become a permanent one. A new thick-film unit was put in and everything was now fine.

"Lucky you had those parts" said the young man.

"Luck had very little to do with it" I said. "I have to order them and about ten million other parts at a cost of billions of pounds so that you and those like you don't have to be kept waiting."

"Thanks" said the young man. "Would you mind if I took the set and paid you at the weekend, because I'm a bit short at the moment?"

### Furious Frank

Frank is (or was) a regular customer of ours. For more years than I care to remember. He'd bought a colour set from us several years ago, and it had proved to be very reliable. He often pops in with various bits and pieces however and waits whilst I fix them for him. During this process he talks incessantly about things which are of interest to himself only, smokes incessantly, and incessantly flicks the ash on the shop floor despite the fact that I put an ash tray under his nose. This time he brought in his sister's old ITT monochrome set (VC200 chassis).

"It's the aerial socket Les" he told me. "The picture goes off and when you pull out the aerial plug and push it back in the picture comes on again." So we switched the set on and in due course quite a good picture appeared and didn't vary however much I messed about with the aerial plug. "Seems all right to me" I said.

"Oh yes, it is for about five minutes or so" said Frank. So we waited a bit while he filled in all the details of what had been happening to him workwise and homewise and I tried to serve customers with their odd bits and pieces, attempting to listen to them as they explained what they wanted.

"There you are" Frank suddenly shouted, scaring me out of my wits. The picture had gone off, leaving a very dull raster which looked ominously familiar to me. I turned the brightness control and the dull raster didn't vary one iota whether it was turned up or down. "You just push the aerial plug" said Frank.

Without much hope I pulled the plug out and pushed it back in again. No change.

"Not like that. Like this" said Frank, grabbing the aerial plug and wrenching it out and in so that the whole set vibrated. The picture appeared with a flash and went off again.

"You can get the same effect by tapping the cabinet" I said wearily.

"No you can't" said Frank, gently touching the cabinet.

I started to lose my cool again and whipped the back off. "This is where you tap if you really want to see what's wrong" I said, tapping the neck of the tube with a screwdriver handle. The picture flashed on and off as I tapped.

"You can't mean it's the tube" said Frank. "You put a new one in only a little while ago." I looked at the label on the tube. It said 1975. "Over six years ago to be exact."

"Well it shouldn't go so soon" he moaned. "What's my sister going to say? She'll have to go without her gin for a week, and she won't like that."

So I put the set to one side as Frank slid off to consult his sister. He phoned later to say that they were still thinking. The next day he came back and purchased a 24in. Philips monochrome set we'd taken in part exchange – the cost was less than installing a new tube in the ITT set.

### In the Meantime

Meanwhile two sets fitted with the Thorn 8500 chassis had come in. One had a blown fuse, and before that had exhibited colour bars, i.e. no colour lock. The other was working but again with no colour lock. The blown fuse was no more than a short-circuit mains filter capacitor, but the unlocked colour was a rather more stubborn problem that couldn't be resolved until the 4.43MHz reference oscillator

crystal had been replaced. We checked the decoder presets on the second set without result, and again had to replace the crystal in order to get the colour to lock. Funny how this decoder seems to need crystal replacement so often – the crystals seldom seem to fail in other chassis.

## A Bouncer

Last month I mentioned the lady whose Waltham W125 had given her trouble – she'd wanted it fixed in a hurry. So we'd snipped off the line output transformer's e.h.t. overwinding and fitted a tripler to get the e.h.t. back quick. I had another call from her the other day. The other windings on the transformer now had shorted turns. No problem this

time, as we'd now got a couple of spare transformers in stock. Once again she wasn't without her set for long: there's a moral here somewhere, if only I could think of it.

## Philips Cube

Finally this month those Philips black box "entertainment centres", with TV, radio, cassette recorder plus clock, all in a compact square (Model 9TC2100). We've had a couple in with field collapse. If you trace the leads from the field scan coils down to the right-hand side, you'll find that they terminate in a plug and socket. Nearby are the two field output transistors. In both cases the BC338 (TS560) had gone short-circuit.

# Simple Variac

Victor Rizzo

IN these days of semiconductor devices that go dead at the drop of a hat, a variac is one of the most desirable items of equipment either for servicing or for experimental purposes. Many are deterred from buying one however because of the cost. The present article describes a very good one which, given a little patience, can be constructed at a fraction of the cost of a commercial variac. The one I made may not be a beauty, but is safe and serves its purpose admirably. It uses tappings to enable all the decades except three in the range 10V to 240V to be obtained. Voltage selection is done by plugging two flying leads into a robust octal valve base socket.

The first step is to find a serviceable double-wound mains transformer, i.e. not an auto-transformer, from an old TV set. Many an old set is rated at 200W, with all the power

used provided by the mains transformer. This should be more than adequate for our purposes.

Next try the transformer and check the turns/volt ratio. This is very important, and can be done by noting the heater voltage provided by one of the windings and seeing the number of turns this winding consists of, then dividing the number of turns by the voltage. In the transformer I used the ratio was two.

Remove the laminations and the secondary windings from the transformer. Don't disturb the primary winding, and don't remove the insulation which separates it from the secondaries. Sand the laminations very lightly, wipe them clean and smear lightly with grease to facilitate reinsertion.

Now make up a new secondary, using wire of the same gauge as the primary winding – the wire must be new. In the arrangement I used (see Fig. 1) this winding consists of seven sections (A-B, B-C etc.) with eight terminals. The number of turns in each section depends on the turns/volt ratio: multiply the voltage required by the ratio and you get the number of turns required for each section. The tappings should be well sleeved and left long enough to be soldered directly to the voltage selection socket. Letter the tappings to avoid confusion later on.

When the new secondary winding has been finished, replace the laminations and tighten them up. The whole transformer can be impregnated with wax.

How you arrange the rest of the device depends on what you have available for the purpose – Fig. 2 is included as a general guide. If the transformer chosen has its own fuse and mains tappings, these can be retained. I housed the transformer in a biscuit tin that happened to be around. A hole was cut in one side for the voltage selection socket, the connector for the flying leads being fixed to the lid. Glue a table showing the voltages available in a convenient place. Include a mains on-off switch if you want, but do make sure that the whole thing is well earthed.

On completion of the device, try it out to check on the voltages available. It's these readings that should be written down on the voltage table of course. Due to mains voltage variations, the voltages will never be spot on. There are so many possibilities to choose from however that this will present no problems in practice.

Table 1: Voltages available.

10V G-H	80V A-D, D-E or E-H	170V B-F or C-G
20V A-B or C-D	100V C-E	180V C-H
30V E-F	110V D-F	190V A-F
40V B-C or F-G	130V C-F	210V B-G
50V F-H	140V B-E	220V B-H
60V A-C or B-D	150V D-G	230V A-G
70V E-G	160V A-E or D-H	240V A-H

The voltages not available are 90V, 120V and 200V.

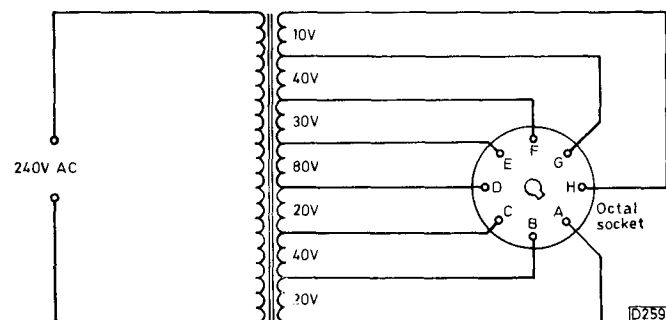


Fig. 1: Circuit diagram showing voltage taps.

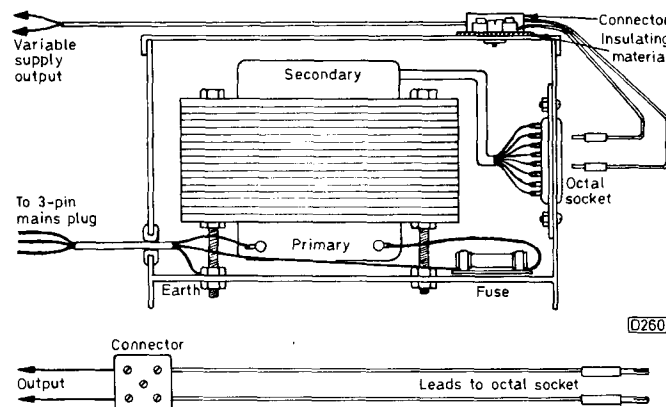


Fig. 2: Cross-sectional view of the prototype.

best I could do was to dangle a short length of wire from the r.f. output socket of a Secam test generator near the CX610GB's whip aerial. Under these conditions the set was found to be able to discriminate between PAL and Secam signals adequately, though weak signals could confuse it. System L test signals couldn't be detected of course.

With a video rather than an off-air input, PAL and Secam signals were both well displayed with the auto switching working excellently. The audio and video outputs from the set were clean and recorded well on a dual-standard VCR. Incidentally, when switching between off-air and external inputs with the same signal source applied to both, the impairment of the signal at r.f. was quite evident – so if your set and VCR have video/audio connectors, use them in preference to routing the signals via the u.h.f. modulator.

### The Innards

The interior is neatly arranged. A combined u.h.f./v.h.f. tuner drives a conventional i.f. chip via a SAW filter. The demodulated signals are filtered by 5.5, 6 and 6.5MHz ceramic filters to remove/extract the sound component, the latter going to a standard intercarrier sound chip. The signals are then passed to the audio/video input/output board, the outputs being a.c. coupled via suitable switches.

The audio signal, either internal or external, is fed to a simple resistive volume control and then to an i.c. audio section driving an 8Ω loudspeaker. There's also an earphone socket.

The video signals are fed to a combined video amplifier/sync separator/pedestal clamp i.c., then pass to separate PAL and Secam decoders. The rest of the RGB and timebase circuitry is conventional.

### Summary

In conclusion, the CX610GB is unique in the low-cost, small-set market. In fact if you need a mains/battery portable colour receiver/monitor you don't have much choice! If you add in the multistandard sound and colour facilities however the set is a winner. It's a shame that the battery capability adds so much to the basic price, but probably most users won't find this essential. From the technical point of view the set is well designed and easy to service, though as one would expect with such a small chassis there are a few tricky bits.

All in all however I'd thoroughly recommend the CX610GB. It would seem to set a trend that other manufacturers with domestic video interests will surely follow. ■

## While the Blizzards Blew

Les Lawry-Johns

WE'VE had one or two unusual faults of late, also one or two unusual customers. This is not so surprising perhaps, because the world sometimes seems to be populated by weird people. I have a message for you from one of them. "Repent now. This is the last year. There won't be another Christmas. The year will see a series of disasters unlike any before, culminating in the final catastrophe. You had better be prepared." In view of all this I wondered why he found it so important to have his little Indesit T12SGB portable repaired. He did however, so I tried to oblige.

### Loss of Signals

The one concerned is the one with push-buttons at the top rather than a rotary tuner at the side (Model T12LGB). The symptom was that the screen lit up, with a trace of grain to show that the i.f. stages were active, but with no signals. So we turned our attention to the tuner, which seemed to be getting its supply voltage but not much by way of a tuning voltage. At the top push-button panel we found we could get only about 2.5V instead of the 30V expected. The suspect components are on the main panel, and we thought we would find that the TAA550 tuning voltage stabiliser i.c. was leaky. It's fed from a line output stage derived 125V rail via an 18kΩ, 2W resistor (R103), and we were surprised to find that the voltage at the h.t. end of this resistor was also very low.

The relevant circuitry is shown in Fig. 1, and what particularly surprised us was that the supply to the video output stage was correct – 125V across C914. As you'll see, two diodes in series rectify the pulses at the collector of the line output transistor to produce the h.t. supplies for the video output stage and the tuning voltage source (the TAA550). If the video output supply was o.k., why wasn't

the supply to the tuning circuit? Then the penny dropped. Not something short-circuit, rather something open-circuit. Like the first diode's reservoir capacitor C911. Slap another 0.1μF capacitor from the cathode of D910 to chassis and back comes the voltage and the ability to tune. An unusual one I thought.

### The Next Oddity

The next odd one was a colour set with Baird on the front, though it was actually a Körting 51763. The complaint was severe interference on the picture. This turned out to be sound on vision, the picture being completely clear when the volume was turned down. At first we thought the cause might be vibration, but disconnecting the internal speaker and using an external one left the trouble just the same – and it really was intolerable.

As a next step we checked the 470μF electrolytic that decouples the l.t. supply to the audio output stage. This was o.k., but at last we were on the right lines, since the l.t. voltage was higher than specified – and varied with the

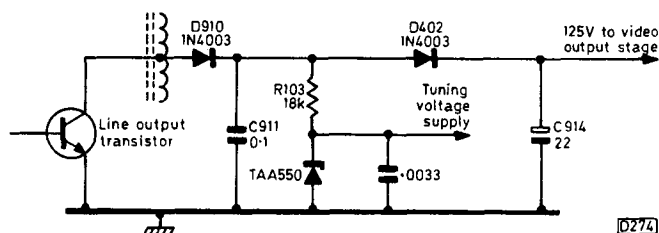


Fig. 1: Method of obtaining the h.t. supplies in the Indesit T12SGB monochrome portable.

volume. The audio circuit is fed from the l.t. bridge rectifier, which also feeds a 24V series regulator circuit. Something must be wrong here we thought, and we proceeded to check the transistors. What we discovered was that the BC178 driver transistor was short-circuit. A replacement restored correct working with an interference free picture – another one we've not had before.

## Don's Diagnosis

Don is another of our local characters. Retired now but as lively and cheerful as ever. Except that is on the occasion when his daughter got married. The shock of the expense made him look miserable for a month either side of the event. "You save up all your life to make sure you'll be all right when you retire, and what happens? Your girl gets married and expects a royal wedding. Don't you worry Dad, just sign each cheque in the book and I'll fill in the rest. Murder it is. Extortion. Robbery. I hope the divorce won't cost as much."

"What divorce, Don. Yours?"

"No. Hers. They demand all these posh weddings and six months later they blame you for helping them get married and want your help with the separation. Mad they are. Mad. And we're just as mad."

"Never mind Don. It'll teach you not have girls late in life next time."

"Next time? You mean we've got to go through this again?"

"So they tell me Don. When you die and think you're going to have a nice long sleep, they add up you're score sheet and send you in to bat again."

"Bloody hell. I hope not" said Don mournfully.

But the months passed and Don now seems as cheerful as ever, threatening to sue all and sundry. "Sue you later." "I'll be suing you." "Sue you in court" and many more in like vein. The other day he came to see us, carrying his Thorn 3500 colour set as though it weighed a few ounces. He exercises with weights each morning you see, which I suppose is why he kept on having daughters until late in life. Maybe if I . . .

My thoughts were cut short by Don's rapid diagnosis of the set's ailment. "It doesn't go Les. Probably a small resistor gone."

"You'll be lucky" I said. "Had one in the other day and it cost the owner a small fortune to put it right. Broke his heart having to spend all that money he'd been saving for his retirement. It looks as if I'll be all right though, with all these sets needing lots of money spent on them."

Don blew on his pipe, and ash scattered all over the place.

"Just have a look Les and see what the time is."

So I took the back off and whilst Don talked to the cat I tried to find out why the chopper wasn't chopping. Now you'll remember the drill. Plenty of h.t. on the body of the chopper transistor, but no 60V supply. 30V supply o.k. So I took the power unit off and turned it up. The chopper transistor read all right, but the diode in series with its

emitter was open-circuit (W609 – we didn't show it in our simplified circuit last month). Out came the TRC100P diode and in went a pair of 1N4002 diodes twisted together in parallel. When the unit was refitted the set functioned quite nicely, needing only a few adjustments to make it 100 per cent.

"What was it? I knew it wouldn't be much."

"Just this little thing Don. You were dead right as usual."

"Thanks a million. Better whip it back home. I'll be suing you."

Don's wife popped in later. "Don forgot to pay you. I don't know what's wrong with him lately. He's not been the same since the wedding."

## Resistors

As a matter of fact Don could well have been right in his diagnosis of a faulty resistor, since it seems that every other set that's come in recently has needed a low-value resistor to put it right. For example, at least three Bush sets (T20 chassis) came in during the last week requiring a new line output transistor base current stabilising resistor (5R8, 1Ω) to get them going. The first time this happened we spent a lot of time checking over things before we got to the real cause of the trouble. It went like this.

Set dead except for h.t. at the collector of the line output transistor. Check the driver transistor's collector voltage. High, showing that it's not being driven. Shunt a resistor across the line oscillator start-up capacitor to keep the line oscillator going despite the absence of the line output stage derived 12V line. Voltage at the collector of the driver transistor falls to 125V, thus proving that the line oscillator and driver stages are o.k. Check the EW modulator diodes 5D6/7 because one of them is nearly always at fault under these conditions. This time they were all right, so we made checks on the line output transistor. Surprised to find that the reverse base-emitter resistance is 22Ω, which is high considering that the base and emitter are linked via the secondary winding of the driver transformer and 5R8 (see Fig. 2). 5R8 was open-circuit of course, so that the transistor was receiving no drive. Needless to say, the next one didn't take us nearly so long to find.

As another example, a couple of Thorn sets (9000 chassis) came in with R726 (2.2Ω) in pieces but with no apparent cause. This resistor is in the collector circuit of the diode modulator driver transistor VT702.

## 'Sno Joke

We've had some pretty cold weather lately, with the cold intense enough to . . . well, you know what. There was a blizzard when friend Ridley popped his head into the shop.

"If we keep burning fossil fuels at this rate Leslie, the greenhouse effect will become so serious we'll all be dying with the heat." So saying he retreated into the snow and fought his way homewards. I went out later to take the dog for his walk. On the way back we had to cross a car park that was a sheet of ice. I slipped and crashed down painfully. It was a few seconds before I was able to scramble back to my unsteady feet. The dog just carried on sniffing, not caring what had befallen me. Two buttons had been torn off the front of my sheep skin, and I managed to find only one of them. I then picked my way painfully homewards to tell Honey Bunch of my misfortune. I'd hardly got the words out when she hit me. "That'll teach you not to fall over and get your coat dirty." Is there no justice at all in this world?

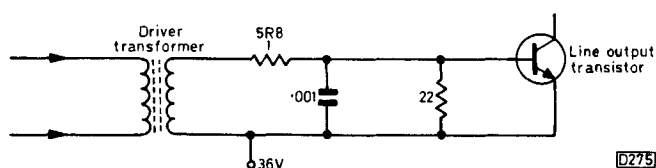


Fig. 2: Line output transistor base drive circuit, Rank T20 chassis. The 36V supply comes from the EW modulator.



where one is attempting to resolve a signal of only a few  $\mu\text{V}$  – often adjacent to the signal from a local 500kW e.r.p. transmitter – this bandwidth reduction is essential.

Once the alignment of the U800 module has been completed, the gain preset can be readjusted to get the correct i.f. levels with the two settings of S1. It is essential to avoid any retuning of the tuner unit during alignment.

The use of the i.f. processor and pre-processor gives three i.f. bandwidths – 6MHz, 3MHz and 2MHz. We thus have a system that will receive the weakest signals at reduced bandwidth and strong signals at the full bandwidth, i.e. at optimum picture quality. The processor and pre-processor can be housed in matching diecast

boxes (three of each in my own installation, with three preset gain, attenuation level and wide/narrow controls, feeding three Thorn portables).

Some final notes. First, respect the 240V a.c. mains input! Secondly, depending on the tuner in use it may be found that patterning occurs when both tuners – the one in the DX unit and the one in the receiver – are operating at the same frequency. In this event, first check the continuity of all coaxial screens. If the problem persists, insert an in-line notch filter at the output from the DX tuner. U800 selectivity modules can be obtained from Hugh Cocks Television Services, Cripps Corner, Staplecross, Robertsbridge, E. Sussex TN32 5RY at £1.80 each including VAT and postage.

## No Mend NordMende

*Les Lawry-Johns*

It all started innocently enough. A middle aged man came in and asked us whether we would repair his daughter's Ferguson colour portable. It had been going all right, but now there was only a white line across the centre of the screen.

"Certainly sir. Just pop it in and pop back later. No trouble."

So off he went and about an hour later a young fellow came in to enquire whether we would handle a Ferguson colour portable which had a white line across the centre.

"Certainly sir. Just pop it in. By the way, are you any relation of the chappie who came in a while ago and asked about servicing his daughter's Ferguson colour portable?"

"Probably my father-in-law. He's going to buy the set from us when we go to Australia in the spring."

It was the young chap who brought the set in later, and my heart sank just a little when I noticed that it was a 3787 – the 14in. colour portable made in W. Germany by NordMende. We'd had heartaches with these before, but after all the trouble was only field collapse, and a new i.c. and a fuse were probably all that was needed. So we put on a cheerful face and asked him to collect it later in the day.

A little later we turned our attention to the 3787. The rear cover was removed, the wing nuts slackened, and the chassis let down. The far right side fuse (there's one nearer) had gone open-circuit, and sure enough it was VU09 (630mA) in the 22V supply line (U3) to the TDA1170 field timebase chip and a couple of other circuits. Not wishing to waste time, we removed the bottom centre field timebase panel and set about removing the TDA1170 chip with its screening heatsink. A new chip was speedily fitted and the heatsink soldered in place. The blown fuse was replaced with an 800mA one, which we understand is the correct and proper thing to do. Switching the set on produced a lovely picture, and we left it on for about an hour just to be sure.

The owners collected it later, and were quite pleased that the job hadn't been a complicated one. Some time later however they phoned to say that the set had worked for about half an hour and had then gone off with a display of coloured splashes and noises. The net result was a white line across the screen again. They brought it in next morning, and said they'd leave it for a

couple of days so that I could make sure.

Investigation showed that the fuse had failed again, so as a start I thought I'd better check out the other lines supplied from the 22V source. Everything o.k., so the next step was a check on the current, which was not at all excessive. Another fuse was fitted (reverting to 630mA just in case) and the set was kept running while I got on with another awkward job that had been bugging me for some time – an amplifier which kept blowing its output transistors every few hours or so.

Whilst engrossed in taking voltage readings in the amplifier, I heard a funny noise coming from the portable – sort of plastic clicks, as though the line output transformer was breaking down. Before I could do anything there was a shower of colours on the screen, with drastic picture size variations – both width and height. It then went off with a dying croak.

Sure enough the same fuse had failed, but this time the difference was that the set was completely out of action and my attention was caught by the rearmost thermal wirewound resistor which had "thermalled". This was RU05 (680 $\Omega$ , 11W) in the soft-start circuit (see Fig. 1). Resoldering this resistor's contacts brought it back into circuit, but it was overheating and would have opened again had I left the set on.

My ice cold logical mind told me that something was wrong. It didn't suggest a solution however. So I checked across the output from the resistor, and there didn't appear to be any shorts. I then started to think. Painfully. The 22V supply is obtained from a winding on the line output transformer. The line output stage had probably suffered when the short (blowing the fuse) had occurred. It was probably still suffering. It's a thyristor line output stage, with the usual flyback and scan thyristors. Hmmm. We disconnected the h.t. feed to the nearest thyristor, the flyback one, and the start-up feed resistor RU05 no longer overheated. Ha we thought, these thyristors are not as tough as they're reputed to be. So I put another one in and switched on. Bang! The mains fuse had blown. I stared at the set and it stared back. With a blank look on its face.

"Now what are you doing?" I asked it desperately. The only difference this time, apart from any accidental wrong connections or maybe another fault developing, was the new thyristor. For want of other inspiration I

refitted the original thyristor and another mains fuse. It didn't go bang, which was something anyway, but the set remained dead and RU05 got hotter and hotter. Here I committed my first error, which was to move on in the search for the fault with the original thyristor still fitted. It was to prove costly in time.

To cut a long story short, it was not until both line output stage thyristors had been replaced, with a different type and encapsulation, that we returned to something approaching sanity. The original conditions were then restored, which meant that we were no nearer to solving the field collapse problem, or rather the firework display which preceded it and could happen at any moment.

I decided to check the voltage rails. I'd already checked the 22V supply, just to make sure that it was there, but a more careful check revealed that it was over 22V. In fact all the rails were high. So I looked around for a preset voltage control and the only one I could find was the e.h.t. control RZ13 on the line oscillator panel. Adjusting this reduced the voltages to those specified, and I was glad to note that the intermittent plasticity ticking or stress noise had now stopped.

Three days on test seemed to prove that the problems were over, so the set was returned to its owners. I still feel that it could bounce back at any time though – Not-Mended?

## No Colour

Then on to the afternoon's outside calls. The first one

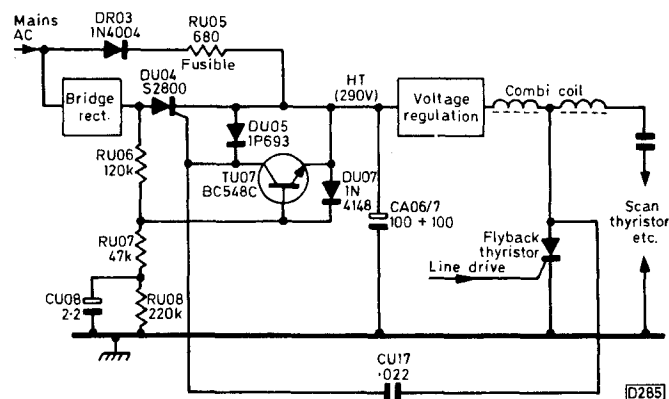


Fig. 1: Soft-start system used in the Ferguson Model 3787 colour portable. When the set is switched on, the reservoir capacitors CA06/7 are charged slowly via DR03 and RU05. As the h.t. voltage rises, the line timebase will come into operation, the pulses at the anode of the flyback thyristor being fed back to the gate of DU04 via CU17. During the soft-start period the voltage at the base of transistor TU07 will exceed that at its emitter: as a result, the pulses are shorted out by TU07 and do not fire DU04. Once the h.t. line has risen to its normal voltage, TU07 will be cut off and DU04 will be triggered, passing the 100Hz pulses from the bridge rectifier to CA06/7. Diodes DU05 and DU07 provide junction protection for TU07. CU08/RU08 ensure that the soft-start action occurs when the set is switched off and on quickly.

The circuit also provides protection in the event of a short-circuit across the h.t. line – say the flyback thyristor going short-circuit. In this event TU07's emitter voltage will fall below its base voltage and thyristor DU04 will switch off – as during the soft-start cycle. DR03 will try to supply the h.t., but the fusible resistor RU05 will go open-circuit.

was to a 26in. Bush colour set fitted with the A823 chassis. It lived in a flat over a bank in a neighbouring town, so the journey involved several miles and much lugging from the van to the flat once we'd got there. I eventually managed to puff up to the front door to be admitted to the colourless set.

I'd brought a decoder panel with me just in case I got into trouble, but it was the early one (as I'd thought the set was) with no provision for the flyleads. I'd no alternative to repairing the set's own panel therefore – assuming that the fault was not in the chroma amplifier section on the i.f. panel. We managed to fit some extension leads to enable the panel to work outside the set, and a couple of checks brought us to the fact that there was no voltage at the emitter of the 11V regulator transistor 3VT2 (BC148). A cold check on this showed that it was open-circuit. It didn't take long to fit a new BC148, when back came the colour and my confidence. The panel was back in a jiffy, and we didn't forget to put the black plug back in to complete the degaussing circuit (we still forget now and again, producing clouds of smoke from 8R5 on the power supply panel). So the job had been wrapped up and the young man came over to enquire how much he owed us.

"Twelve please."

He was gone for a few minutes and returned with a pound note. "Keep the change" he said.

I looked at him carefully and decided to laugh and join in the fun. "My fault I suppose. Should have said twelve pounds. That'll teach me to be more explicit."

The young man apologised and said he'd thought twelve pence was a call out charge since the repair had been done so quickly. . . .

## Femme Fatale

Sneezing and coughing, I made my way to the next call. The young lady who opened the door was passing fair in more ways than one. Her blonde hair was plaited and piled up on top, and her smile was welcoming as she lead me to the lounge where the set lived. It was a Thorn 9000 which didn't appear to do anything.

I immediately got to work and found that there was plenty of h.t. up to the chopper/line output transistor but not much else. Tapping the panel caused the set to burst into life, and it didn't take long to find a dry-joint which was speedily put right. Panic over, I put the set back on its frame, replaced the back cover, and suddenly became aware that the young lady was reclining on the settee with her long blonde hair released, flowing down to her waist. . . .

"Some people are troubled by conscience" she was saying, and I was also aware that she'd been talking for some time though I'd not been listening. "Conscience has never bothered me" she continued. "I always do what I want when I want and it seems to work out all right."

"Quite so" I stammered, blowing my nose violently. "This dose of flu I've got is deadly."

"What you need is a large scotch and some sympathy. Would you like me to get you a drink?"

"No thanks" I said, "I really must get back to the shop. Must take a powder." In fact I didn't have the flu, it was a cold. Plus cold feet. After all, what if there'd been some of those video cameras hidden? We've read about these things, haven't we? And anyway I don't like drinking scotch during the day.

tuning operates, as shown by the indicating digit on the display, but the tuning voltage flattens out at some 15-20V instead of rising to just above 30V), or if the leak is severe the station going off when the store button is depressed. Otherwise these machines are very good: the picture is excellent, there's noise-free fast search and stop frame, and the simple mechanism that provides cassette loading and tape threading with a single motor is a masterpiece of ingenuity. **M.P.**

### **Sony C7**

The problem we had with a Sony C7 was that the tape would thread but would not play. Fast forward would not operate either. If the end alarm switch was on, it would sound and the tape would rewind. Having had the problem of auto-stop on the Bush BV6900, I went immediately to the forward oscillator circuit, hoping to find an adjustment. There isn't one on this machine however. Circuit checks were then made and we discovered that the voltage coming from pin 8 of the sensor oscillator i.c. (IC8 on the SY11 system control board) was incorrect at 10V. The circuit is basically a metal detector, so I checked the sensing coil. The resistance was the same in both cases, but when checked back to the board was 35Ω instead of 2.5Ω. This turned out to be due to a build up of oxide deposit on connector CN4013. All was restored to normal after cleaning. **M.S.**

### **Sony C5**

The fault with a Sony C5 was a line drifting down the screen, on record only. Playback with a test tape was o.k., and on looking at the fault it was clearly due to the head switching point shifting. RV3 on the AS6 board was found to work but was not able to compensate for the problem.

While making a recording and checking with a scope I changed channels. The servo reference pulse didn't attempt to lock in at all, and on tracing the pulse back towards the video signal I found some minor discrepancies between the board diagram and the circuit diagram, in the sync switching between record and playback. It

appears that the block diagram had been taken from the C7 manual. On checking around this section I found that D27 was connected to C403, but neither were connected to pin 4 of IC12 (internal switch for record/playback reference). Making this connection removed the fault.

There was also a voltage discrepancy at Q69. Perhaps a corrected diagram should be issued. **M.S.**

### **Philips VR2020**

Here are a couple of symptoms we've had with Philips VR2020 head faults. The first was playback of pre-recorded tapes o.k. but a tracking error on record. One of the actuators that moves the heads up and down had failed. The other symptom looked very much like open chicken netting, affecting the chrominance only. A new head drum cured the problem. **M.S.**

### **Ferguson 3V30**

A Ferguson 3V30 we had in recently would thread up and produce a static picture but wouldn't run. Rewind and fast forward were o.k., but once the tape threaded up the usual clunk, i.e. the pinch roller engaging, was not heard. On removing the cover we saw that the pinch roller was indeed disengaged. I then threaded up the tape and found that the roller would hold in if pushed towards the capstan. There are two transistors in the control circuit, Q4 and Q5. The latter is fed with a pulse at the end of threading up, to supply enough power to pull the solenoid in, and was open-circuit base-to-collector. **M.S.**

### **Philips N1700**

The fault we had on a Philips N1700 looked like the line hold being out on playback only. The servos were all locked rock solid to the reference signal, and after changing the servo panels the fault was still present. I was wondering what to do next when I noticed that the 50Hz reference signal was not synchronised to the 50Hz mains (generated from my hands holding the scope lead). The cause of the trouble was a break in the wire that carries the 50Hz mains signal to the servo board. **M.S.**

## ***Raising the Dead***

***Les Lawry-Johns***

A LITTLE while ago a chappie came into the shop and asked whether we'd be interested in buying a colour set for which he'd no further use. We cautiously asked what make of set it was? Philips was the reply. "Does the sound come on as soon as you switch the set on?" "Yes." So it was probably a G8 and thus a viable proposition to fill the role of a loan set, of which we had a need. A deal was struck, and later that afternoon I climbed six flights of stairs to the top flat, where the set lived. Narrow stairs I noted.

He showed me the set working, and whilst the cabinet was in good condition the picture appeared to be a bright cyan, with not a trace of red in sight. Even so I thought it was worth taking a chance, so I paid him and removed the screws which secured the set to its stand. Then came the task of carrying the set down to ground level. He offered to do this for me, but seeing that the set was now my

property I declined the offer and asked if he'd be kind enough to bring the stand down for me?

### ***Return to the Ranch***

So I picked my way down the stairs, carrying the 22in. set at an awkward angle. Now I'm well aware of what you're hoping or at least expecting me to tell you next. Well, there were a few moments when I thought it might happen – the set tumbling down with me tumbling after it – but don't forget that I always put my socks on standing up. I was as sure footed as a mountain goat on those difficult bends where the right foot had plenty of space but the left foot had only an inch to feel for. Huffing and puffing, we eventually made it out to the front of the house, just in time to see a traffic warden taking notes just because there were these double yellow lines.

"Oh it's you" she said, putting her pad away.

"Don't just stand there" I wailed, "open the back up before I drop this thing."

She did as she was told, as all women should, and muttered in my ear "one of these days I'll catch you when there are lines on the pavement as well."

"One of these days I'll catch you when you haven't that uniform on" I said, "then I'll have my wicked way."

"Who would help you then?" she said.

At this point I remembered the stand. "Keep an eye on the van love, something's missing."

I nipped back in to find him laying at the foot of the stairs with the stand around his neck, mumbling something to the effect that the stairs would one day be the death of him. Apparently he'd stopped to have a word with someone on the first floor, and by the time he started down again I was out at the van. Which was why I hadn't heard the crash. What a good job he'd not been carrying the set. Oh yes: was he hurt? Well I don't think he suffered any lasting injury, and the stand was still in one piece. So, wishing everyone the best of good luck, I departed for the shop to make sure that everything there was going according to plan. I found Honey Bunch listening patiently to a customer who was describing what was wrong with his set.

It was a portable, and apparently wouldn't go unless turned over and slapped on the bottom. Honey Bunch seemed to find this very interesting. "I see. It won't go until you smack its bottom. Fancy that! Well I never!"

It transpired that the line output transistor was bolted to the bottom panel on a heatsink and that the nut was loose. A jolt was necessary to complete the path to the collector of the transistor. A turn with the pliers was all that was required. This made the customer happy, but Honey Bunch kept on about it. Her comments were interrupted by a loud noise outside.

### **The Wheelbarrow**

We were somewhat surprised to see a large iron wheelbarrow being humped up on to the pavement by two chaps. In the barrow was an object covered by a piece of black plastic sheeting that was secured by a number of house bricks. They brought the barrow over to the shop door and proceeded to remove the bricks, dropping them on the ground. Eventually the object was uncovered. It was a Decca 30 series set (Bradford chassis) which they then carried into the shop. They were apparently father and son, and father did the talking.

"I came in last Saturday and told you the sound had gone off on my TV. I asked you which valve it was and you said it could be the PCL82 or something that carried the juice to it – perhaps both." He talked on without a pause. "The valve I paid you one pound sixty five for hasn't done the job so we've brought the set along. We live at Meopham (about six miles away) and I know you'd charge if you came out. Can't see me paying through the nose if I can bring the thing in myself, so here it is. Picture's lovely – isn't it son? Sound's gone off, that's all."

Six miles. Through rain and wind. What courage! What fortitude! What an idiot! The poor old set must have been shaken out of its life after all that way on an uncushioned metal barrow.

With some misgivings I took the back off and plugged it in. The valves warmed up but there was little other sign of life.

"Where's that lovely picture you mentioned?" I asked.

"Something must have happened on the way" he moaned. "Anyway, here's the valve I paid you for. If you give us the money back me and the boy will go and get ourselves a cup of tea while you do the set." I wondered about the import of this statement, but gave him his one sixty five and off they went.

Pulling the chassis back I was able to reach the h.t. fuse which had failed. With a new fuse fitted the e.h.t. rustled up once the valves had warmed, but there was no sound. The 1.8k $\Omega$  resistor that supplies the h.t. supply to the PCL82 audio amplifier/output valve was open-circuit. It had died a natural death rather than being killed by the PCL82, so we wrapped the job up and found a nice piece of packing for the set to travel on more comfortably.

A little later the owners returned from their refreshment. They didn't argue about the service charge (much to my surprise), so apparently they hadn't needed the one sixty five to pay for the tea.

### **Red is Dead**

At last I could investigate the newly acquired G8. Voltage checks on the base revealed that all three guns were receiving equal voltages, but there was no sign of red. So we asked the tube tester for help. It said blue gun good, green gun good, red gun nothing. We then employed the tester's reactivation section. Still nothing.

So we brought into action the reactivator we built from the *Television* design published back in April 1978. With a meter in series with the red cathode and boost applied to the heaters we got a reading of only a few microamps. Left for a bit the needle climbed a couple of microamps and then fell back again. Clearly the red gun was bugged. We would have to fit a new tube, but meanwhile we could hardly hurt this one so we decided to carry out a couple of experiments. The normal heater supply from the tester is 6.3V, the boosted supply 8V. How about some more? We've a bench supply for checking car radios, cassette recorders, etc. This normally supplies 12V at 1A, but can provide more – up to about 15V.

With nothing to lose we applied 12V to the heater pins, with the red grid and cathode still connected to the reactivator via the meter. After a few seconds the heaters glowed very brightly. A few seconds later a nice spluttering came from the red cathode and the meter's needle swung over to 60mA, with the lamp lighting just to add fun to the proceedings. We immediately removed the 12V supply and reconnected the reactivator's heater supply. The heaters dimmed nicely, but the needle still maintained the full reading and the lamp remained alight to show that the red cathode was alive indeed, as were our hopes. The set is still giving a reasonable picture in fact, and we hope it will continue to do so for a while.

Thus encouraged, we decided to try the process out on another duff tube – one whose green and blue guns had both gone. This time the results were not as hoped for, and we realised that our first experiment had been a lucky one.

Finally, if you try this excess heater volts lark don't blame us if the heaters fail on you. Do it only if you've nothing to lose.

### **Footnote (ha ha!)**

Oh yes, and Honey Bunch says if he's as sure footed as a mountain goat how come he falls over a snow flake and rips his sheepskin?

# Mr. Daines' Dynatron

Les Lawry-Johns

BY and large Dynatrons are not sets that lend themselves to being carried about, at least not far. So when Mrs Daines phoned to say that her fairly new Dynatron was giving trouble I packed my bag carefully so as not to get caught short as it were. The initial complaint was of intermittent sound, so we were fairly confident that we wouldn't have to hump the set about too much.

We arrived at the house and exchanged pleasantries with Mrs Daines, her small daughter and her large red setter which appeared to me to be the largest of its breed I'd ever seen, height and lengthwise that is as they are pretty lean dogs. Suffice it to say that when I bent to remove the screws from the back of the set his head and mine were about level – so I was glad his tail was wagging. Since the set used the Philips G11 chassis the number of screws that had to be removed was limited (unlike the twenty million that secure the backs of earlier models).

As I removed the rear cover Jason's tail stopped wagging and he started to bark angrily in my ear. I moved smartly to one side to allow him full territorial rights. I wasn't quite sure what was upsetting him, but in retrospect I can understand: he knew what I was letting myself in for and was warning me off.

"Shut up Jason" I asked him nicely. Bark, bark, bark.

"Sod off then" I said not so nicely. Bark, bark, bark.

Mrs Daines appeared and dragged the irate Jason off. She then shut him in the kitchen and returned to find out what all the fuss had been about.

"What did you do to him?" she demanded.

"I didn't do anything. I just took the back off the set and he started up."

"You didn't kick him or anything?"

"Nope. It was something in your set that upset him. Probably that diode sticking out up there – some lazy bugger's stuck it on the wrong side of the panel and used the wrong type into the bargain."

"You're the first one who's taken the back off: it's practically new and we bought it in the West End, from a very well known store."

"In the sale?" I queried.

"Yes. What difference does it make?"

## Audio Output Transistors

"None really I suppose" I said doubtfully. "Anyway it's nothing to do with the sound." So saying I shone my little torch on the lower left centre where the audio output transistors live and there, on the base of one of the BD131s, was a classic dry-joint. I soldered it up properly and tried the set. The sound came on loud and clear. My job was done – so I thought. We let Jason back in and his tail wagged to see the back on again. "Funny dog that" I confided as I took my leave.

## A Funny Noise

I'd hardly got back to the shop when she rang again.

"There's a funny noise on the sound, a loud rustling noise."

So back we went and having ensured that Jason was safe in the kitchen we took the back off to try to locate

the source of the noise.

It was a remote control model, so there was a small extra panel fitting into a socket which in ordinary models has two of the pins shorted across. When this small panel was removed the noise stopped, so we were sure the trouble wasn't anything to do with the BD131s that had received attention earlier. The noise was also absent when we shorted out the two end pins, so it seemed likely that the trouble was on the panel we'd removed. We put it back and the noise returned, stopping when we shorted the base and emitter of the BC158 on the panel. I searched through my untidy spares box and at last found the required transistor. In it went and the sound was no longer disturbed.

## It's Gone Right Off

I was just getting into the car when Mrs Daines called out.

"It's gone right off now, picture and all."

Heaving a sigh, I carried my little boxes back in again.

This time one of the 3·15A mains fuses had blown. Now this normally means that one of the bridge rectifier diodes on the bottom right power supply panel has gone short-circuit. Remove panel and check diodes. As they seemed to be all right I then had a quick run over the thyristors etc. No joy. Change diodes anyway since they are suspect and if the fault lies elsewhere, say on the upper line output panel, the 1A h.t. fuse would have blown. So with four nice new diodes fitted we switched on confidently. Hrrump bonk it went. Now this is not the sound of a direct short – you just get bang in that case. My decision was lightning fast. "Fetch Jason in."

Mrs Daines shook her head in resignation but still fetched Jason. In he came, tail wagging and friendly. Until he saw the back of the set exposed. "Bark, bark, bark. Bark, bark, bark."

My eyes narrowed at this fresh evidence. So out came the supply panel and we examined the h.t. fuse closely. It was a 3·15A type. Swine! In a trice I'd slapped the meter across the protruding diode. Dead short. Now it's one of the EW modulator diodes and although it had no marking it closely resembled a BY127. It should have been a BY223. I showed Jason the shorted diode and he barked at it. "Good boy" I said. "Clever boy – you knew it shouldn't have been there."

So with high hopes we fitted the required BY223, a 1A fuse and two new 3·15A fuses. On came the set as good as gold. Or so it looked to me.

## Bowed Sides

Later that evening Mr. Daines phoned. "Thank you for doing our set. But should the sides bow in so much? – the snooker table looks like an hour-glass."

"See you tomorrow Mr. Daines." Why hadn't Jason noticed the concave sides?

Mr. Daines was there when we arrived. He said his wife had popped out just before I was due to arrive as her nerves weren't too good lately. He would watch how Jason behaved.

I took the back off with Jason sitting beside me. His tail wagged all the time, seeing that nice smooth vista of panels. Not one bark passed his lips. When an ordinary picture was examined the edges could be seen to be bowing in, but it was when verticals were displayed that the fault was most obvious.

The EW centre shaping control is on the top left side, just inboard of the width control. Neither control had any effect, so we checked the following transistors and found that the extreme left side one, T150 on the heatsink, was open-circuit. We raked around in the spares box but couldn't find a BD238 and had to settle for a BD428. It seemed to be quite happy in this position, and the width and EW shaping controls now functioned as they should. We asked Jason if he was happy, and as he said he was we had a quick check up for dry-joints on the line output panel (a happy hunting ground for poor connections on this chassis) and at last wrapped up the job.

We haven't heard from the Daines' since, so we must conclude that all is well. The moral of this story seems to be that if you have to go out to a G11, take a red setter with you.

### **The Philips TX Chassis**

We now have to relate the sad story of a set we couldn't do. It was a Pye monochrome portable using the Philips TX chassis. We've serviced lots of these, all with no trouble at all. Most of them have suffered from poor smoothing, which has been put right by replacing the BD434 series regulator transistor or an associated component. When we were presented with this one we were informed that it had been obtained from a club and that it was still under guarantee. We were not wholly enthusiastic about taking it on therefore, but as it was suffering from what seemed to be poor smoothing we thought we might be able to help out with a quick job.

"Call back in an hour or so" we said recklessly.

The heartache then started. We checked the regulator. No fault here but change the transistor just in case. Check the reservoir electrolytic. No fault but change it just the same. Check the voltages and note that the 10.5V preset R113 has no effect at all. Also find that the input to the regulator is little more than 11V instead of 15.3V. Ah ha! A regulator cannot perform its regulating and electronic smoothing functions when the input is low. So why is it low? Check the bridge diodes and change them just in case. Still a horrible hum bar.

Check carefully through the regulator's control circuitry. Everything in order. Note that the 47Ω resistor (R110) in parallel with the regulator transistor is not fitted as the set has remote control. Check the 100μF 10.5V line decoupler (C113) and find it o.k. Begin to sweat. Check everything again. Start to swear. Owner returns and note that he's driving a Decca van. "Sorry" I say. "Can't find the trouble."

"Don't worry. I'll get the chaps at work to sort it out for me. They told me to bring it to you first."

"When they do sort it out" I said humbly, "would you ask them to let me know what it was?"

About a week later they did ring. After much toil and sweat going over the same ground they chased the grey lead up to the remote control receiver panel – not part of the main deck, but on the upper left behind the tuner selectors. There they found an open-circuit resistor. They were quite pleased to let me know. Well done Racal-Decca. Bad show Uncle Les. Clot!

# next month in

# TELEVISION

## ● THE REDIFFUSION Mk. 4 CHASSIS

Rediffusion chassis always have something a bit different in them. This latest one, which is found in Doric, Murphy and Ambassador sets as well as Rediffusion models, is no exception. It's designed to drive either 90° or 110° tubes with only minor changes, and incorporates an audio/video interface panel as standard. The parallel chopper circuit is controlled by a TDA1060 i.c., and a single 40-pin chip is used as the colour decoder – type TDA3300. A feature of this chip is the use of negative feedback to provide automatic black-level correction.

## ● SERVICING FEATURES

S. Simon on tests for common faults in the GEC C2110 series solid-state colour chassis and Tony Thompson on the Luxor 90° hybrid colour chassis used in many ex-rental Rediffusion colour sets.

## ● VIDEO SYNTHESIZER REVIEW

And now for something different. Eugene Trundle decided to see what the Chromascope video synthesizer could do and subjected it to a number of tests.

## ● EXTRAS FOR THE HITACHI VT8000

Derek Snelling found that the basic VT8000 machine could be easily adapted to get half speed, double speed and tape indexing. The latter puts a signal on the tape so that it stops at the beginning of each recording in the fast forward and rewind modes.

## ● COLOUR PORTABLE UP-DATE

Some minor modifications and a new line drive arrangement. Also the latest on the BTW58 GCS and using the TDA3561 in place of the TDA3560.

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# Ah For Yesterday!

**Les-Lawry Johns**

WE seem to be losing our touch. Sets keep coming in that I haven't the parts for or the problem is one that can't be dealt with in the time available. Like the Bush T20 which wouldn't start until I disconnected the left-side signals panel. I thought that would be easy. Just connect each plug in turn until the one with the short is identified, then check the relevant circuitry through. I subsequently found that the set shut down whenever the signals panel earth connection was made. This was so even with all the other connections except those to the tube base removed. The fault remained when the tube base was disconnected, so what was causing the overload? At this point the owner returned. I tried to explain to him what was happening, but he looked as blank as I did.

"If it's going to be trouble, I'll take it back where I got it. It's still under guarantee you know."

It's a fact that a lot of people think that the four year tube insurance is a four year guarantee on the set, but I kept quiet.

"Oh well, if that's the case I'll put it back together so that you can take it" said this coward. Which I did, and he took it. If the person who finally did the job and located the fault reads this, perhaps he'd let us know what it was all about.

Like the Garrard hi-fi music centre with both loudspeakers faulty and the fuses blown. One output pair of transistors was shorted, and I thought they'd be of the ordinary BD203/204 variety. When I looked up the BDX53/54 devices fitted I found that they were Darlington. So I did a quick phone around. Not in stock. Sorry don't keep them. I eventually got the npn half, but nowhere could I find the pnp half (TIP135 etc.).

In the meantime I thought I'd check up on the good side with a new speaker fitted. Someone had been there before me, and although the circuit was working from the output stage back to the audio input there were no signals from the radio or gramophone sections due to a mix up of the many interconnecting leads. I surveyed the whole thing and decided to remove the new loudspeaker, replace the old one and call it a day (to be fair, after a few hours of torment and making up a pnp Darlington pair, then finding that this side wasn't working either). I decided to spend the rest of the day sulking, and immediately got into trouble with Honey Bunch. She put her hands on her hips and launched into a bitter tirade.

## Onslaught

"I don't know what's got into you lately. You don't do anything properly. Most people wash their hands after they've been to the loo. Not you. Oh! no. You have to wash your hands before. How vain can you get? And do you have to put the lead round your own neck when you take the dog for a walk? If you don't pull up those socks you keep mentioning there'll be a change here all right and you'll be sorry."

Well. What an outburst. And so unjustified. Of course I wash my hands before going to the loo. You can't be too

careful. What with all this infection about. And as for the dog's lead, he doesn't want it on and the chain makes it heavy so I put it around my neck to leave both hands free to waive to everyone – and to carry the bottles from the off-licence.

But it was the first bit of the onslaught that gave me pause for thought. Was it a fact that I wasn't doing things properly? I thought it was just a coincidental run of useless jobs that would not have been profitable anyway – and one can hardly be expected to tackle everything that comes along, can one? A tiny voice at the back of my mind said "you used to".

Yes, that's true. I used to work all hours, doing the jobs that didn't pay as well as those that did. Vanity, that was it. I'm not so vain any more, and I'd rather put my feet up for a couple of hours in the evening – and watch television! When I think of all the running around we did in the fifties, working round the clock and actually enjoying it (though we never let on)! We were younger of course, full of vitality and virility. Things were also a lot more straightforward: there was nothing like the almost evil complexity that seems to permeate everything these days. I feel I'm not alone in this weariness of never ending complication, but if anyone feels inclined to disagree I ask one question first – what age are you old chap?

## Mr. Frisby's Murphy

Anyway, that's quite enough of this depressing clapping. Let's get on with some work done properly – this time. Mr. Frisby sailed in carrying, with some difficulty, his 26in. Murphy (Rank A823 chassis). He put it down, again with difficulty, and his trousers split at the rear.

"I thought that only happened to me" I consoled him.

"Bloody heavy set that" moaned Mr. Frisby. Ben, our collie, came round to see what was going on and Mr. Frisby went to pat his head. Ben snapped at his hand and Mr. Frisby jumped back in alarm.

"He only bites men" I explained, having ordered Ben out of the shop in disgrace.

"Do you get many customers in here?" asked Mr. Frisby.

"Not many."

"I'm not surprised if you keep a vicious dog that bites everybody."

"He's getting old and grumpy, and it's taken me a long time to teach him to bite men and not women. Now I've got to teach him not to bite anyone during the day, but it's taking a long time."

Mr. Frisby gave up on that one and explained about his set. Apparently the sound was o.k. but there was no picture (raster). With it up on the bench we found that there was h.t. at the top fuse so we moved across to check the c.r.t. base voltages. Plenty of voltage at the first anodes, cathode voltages slightly high, grids slightly negative. Shorting the common grid point to chassis produced a pale raster with no modulation.

"How much are you going to charge me?" asked the anxious Mr. Frisby.

"You'll get about fifty pence change out of fifteen quid, counting the VAT" I estimated, bearing in mind the cost of the SL901B decoder i.c.

"You charged me only a fiver last year."

"This time it looks like a rather expensive chip, but you can hang around if you like while I make sure."

So he hung around whilst I checked the other possibilities, but as I was getting nowhere I started to unsol-



der the SL901B. He watched this operation, fascinated. "Those pins are close, aren't they? You'll have to be careful when you put another one in. Have you got another one?"

I stopped operations. "If you say another word I'll call the dog in." He started to say something, then shut up.

The new chip was fitted and the decoder panel replaced. I was fully prepared to be proved wrong by a blank screen, but the picture appeared, albeit with the green missing. Fortunately the green output stage is the first one in on the top of the panel, so it was no great task to take voltage readings with the panel in place and wedged open with half a reel of used tape. Collector voltage high, base voltage higher than normal, nothing on the emitter. So in went a new BF337 and the picture looked more normal. As I was putting on the back cover, Mr. Frisby started to get his money out.

"Change out of fifteen quid you said."

"That was for supplying and fitting the chip. Not for the extra transistor, and fitting it."

"Just thought I'd try it on" he smiled. "I called in one of those chaps who advertise in the paper. You know, no call out charge and free estimate. He wanted thirty five quid for a new decoder panel and said that was cheap." So Mr. Frisby parted with half of that and went away quite happily.

### ***The Vet's G9***

Although we've sold more G8s and G11s, plus KT3s and K30s, than I can remember, we've sold only one G9 so far as I can recall. That was to our local vet, and of course we have to keep on the right side of him and his partners. So when he arrived with the set in the back of his car we assured him that he'd be kept waiting no time at all. His description of the fault (sides coming in and going out, then no picture at all) suggested that it was the trouble common to all G9s – the 2,200 $\mu$ F electrolytic on the line scan panel. It did look a bit sick, so we changed it. The no picture condition remained however, and there was a familiar acrid smell . . . Surely not. But it was. The line output transformer was hot to touch, and remained dead with the tripler disconnected.

We had lots of G8 transformers, but not a G9. None of our local friends had one, so all we could do was to order one by phone and wait. The best laid schemes . . . I've since learnt that a new wholesaler has opened up not far away, and that I could have obtained one within the hour, but I didn't think. Isn't that where we came in?

### ***Mistaken Identity***

I was in this queue of traffic waiting to leave a car park and we didn't seem to be getting very far. I noticed the woman in the car in front looking in her mirror – and not at herself. She seemed to be looking at me.

I saw the driving door open, and a pair of shapely legs swung out. An equally shapely lady followed and came straight back towards me – smiling, I was glad to note.

"Hallo darling. How lovely to see you. Just as pretty as ever" she gushed.

"Evergreen" I admitted. The cars ahead then started to move and off she dashed, calling out something about phoning.

I'd never seen her before and can only think I must have a double. Handsome perhaps, on a very dark night, but pretty?!

# next month in

# TELEVISION

## ● SERVICING THE RANK Z718 CHASSIS

The Z718 followed the famed A823 series, being the first Rank chassis to use an in-line gun tube. Large quantities were produced over several years, many being distributed by Comet Radio. Part 1 of a detailed servicing guide.

## ● SATELLITE TV INSTALLATION

Earlier this year Steve Birkill installed a demonstration 4GHz satellite receiving terminal at Sonic Sound Audio Holdings. In describing what this involved, Steve provides much insight into the present possibilities and state of the art.

## ● VCR MATTERS

Part 4 of our series on the Philips VR2020 describes the elaborate motor control system – the machine uses five separate motors. Also the article on modifying the Hitachi VT8000 originally scheduled for publication last month.

## ● ROUTINE TV SERVICING

S. Simon outlines basic servicing procedures to adopt when confronted with an ailing ITT hybrid colour receiver (CVC5-CVC9 chassis).

## ● WIDEBAND UHF AERIALS

There are two basic ways of obtaining wide bandwidth with a u.h.f. array – the long Yagi and the stacked bow-tie. Roger Bunney discusses their relative performance characteristics.

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# All Good Clean Fun

Les Lawry-Johns

FIRST a story about Mr. Bee, a busy little fellow who likes to know how everything works. In other words he pokes his nose into everything, and has a go even at complicated things that frighten lesser mortals (like you and me). His TV set is a 14in. colour portable fitted with the Philips KT3 chassis, and is of adequate size for the small room he occupies. When it went wrong he took it to his friend Raymondo, an experienced engineer who spends his days in a fully equipped workshop surrounded by thousands of TV sets and VCRs that await his expert attention. Mr. Bee complained that the picture had shifted across and couldn't be centred. He then left as quickly as he'd come.

Raymondo spent many hours checking likely suspects, then many more checking unlikely ones. Eventually he cried "enough, enough!", and phoned Philips Service who advised him to check all the things he'd already checked and then suggested he let them know what it turned out to be.

So, lonely and dispirited, he turned once more to the off-centre picture. Quite by chance there was a degaussing coil on the bench, and Raymondo picked it up and shook it at the set in anger, switching it on by habit. To his amazement the set's screen became blotched, with wrong colours. He waved the coil at it again, and the screen became even more impure. This was the last straw, and Raymondo shouted "you're not supposed to do that. When I degauss you you're supposed to become pure, not impure".

Next he turned to the task of purifying the screen, and as he did so the picture shifted over to its correct position. During all the hours he'd spent he'd not thought of the purity magnets. Why should he? Who'd shifted them in the first place and why?

Mr. Bee should clearly be questioned. So when he came back Raymondo pounced. "Why did you alter the purity magnets you silly bugger?"

"I had to. The purity was atrocious after we changed the room around."

"Where did you stand the set?" asked Raymondo carefully.

"On top of one of the hi-fi speakers . . ."

## Fancy Falling for That One

I should laugh at others. Look at the one I fell for the other day. My face is still red.

In came this Pye colour set fitted with the 725 chassis – the one with the vertical boards that always seem to stick in the runners when you're sliding them out or sliding them back in again. It's worse when you take the panel out altogether, because when it comes to replacing the panel you just can't seem to get the angle of the top bit of the jigsaw right to permit entry. I've just about got it worked out now after some four or five years. A bright young lad who had nothing to do with TV work showed me how to do it in thirty seconds a long time ago, but I still had difficulty long after he'd departed. We've handled so many now however that they no longer give us heartaches, and this one wouldn't either if only I'd stopped to think and remember for a moment. But I didn't.

The 800mA h.t. fuse (F971) had failed and I immediately suspected the BU208 line output transistor. A quick check showed that it was indeed short-circuit. I don't like replacing line output transistors in this chassis because the fixing screws are often stubborn and I certainly won't ask son-in-law Dougie to help with their removal again (remember his "no problem" when he hit the screws an almighty bang and bloody nigh shattered the panel?). This time the screws didn't offer too much resistance however, and a new BU208 was soon fitted. There didn't seem to be any shorts, so we fitted a new fuse and switched on. The fuse glowed a pretty red and the new BU208 gave up the ghost.

"Fool" I said, taking the panel out again. In went my last BU208, then I unhooked the tripler and fitted a 150Ω wirewound resistor across the fuse holder to limit the current in case it was still excessive. It wasn't, so like an absolute idiot I fitted a new tripler and connected the meter across the fuse holder, switched to the 500mA range. Switch on and the needle goes right over – I removed the meter probe just in time to save the BU208.

So I started talking to myself. "Disconnect the tripler and we're laughing. Connect it up again and we're crying. There must be a short in the tripler or something it supplies. We've changed the tripler so that's out. What else is there?" Fool, idiot, maniac. The c.r.t. first anode supply reservoir capacitor C563 (0.1μF, or 100nF if you prefer it that way), which is charged by the clipper diode in the tripler. Fancy forgetting a simple thing like that. Easy to do however as C563 hides under the top of the line output stage screening box. It was short-circuit of course, and a 1.25kV replacement put things to rights and allowed us to refit the old tripler – with apologies to it of course.

## Even Dafter

I then went on to commit another howler. On a simple Pye 163 chassis – the large-screen hybrid monochrome one, not the portable. A development of the 169 if you remember. It came in because of intermittent loss of signals, both sound and vision, the screen going completely blank when the fault occurred, leaving a clean raster.

I immediately assumed that the fault was late in the i.f. strip, first because the sound also went, and secondly because there was no noise on the screen as there should be if the i.f. stages were working. So I patiently plodded through the i.f. stages and they all seemed to be in order, confusing me no end. Next I injected signals from my trusty (and old) Advance signal generator. The bars proved that the i.f. stages were in fact working, and that the a.g.c. circuit was incorrectly set up – hence the absence of the expected noise. So I accused the tuner and fitted a new one.

On came the picture and sound. For ten minutes. They then went off again, and a meter check showed that there was no tuning voltage. Shouldn't this have left the tuner operative, albeit without programmes? At last we consulted the circuit, and realisation hit us. The 11V supply for the tuner is also obtained via the 22kΩ, 2W resistor at

the top of the chassis. Once again I'd overlooked a simple and extremely common fault – common because the resistor originally fitted is not man enough for the job. Perhaps the intermittency had led me astray. Perhaps the lack of noise on the screen. Perhaps, perhaps. But the fact is that I should have waited for the signals to disappear and then checked the tuner unit voltages in the first place, not jumped to hasty and wrong conclusions.

### **E. Knell and the Bush Ranger**

Mrs. Knell paid us another visit recently. This time I wasn't frightened of her because I'd found out that her real name was Elaine Knell, not Eskimo Knell as I'd so foolishly thought those few months back. She had with her a small, white Bush Ranger portable, and gave me a radiant smile. "I hope you're feeling better now. You looked a little groggy last time I called" she said in her soft, seductive voice. I looked at her perfect, rather pointed teeth.

"To tell you the truth I thought you were a man eater" I confessed.

"Opportunity would be a fine thing" she said. "I couldn't have frightened you that much surely?"

"Well you see it was the name. I thought it was that lady who lives in the Yukon and eats men for breakfast, and Dead Eye Dick and Mexican Pete rode down to the Rio Grande to get away from her."

"Oh, I see! Those old rugby songs my dad used to sing. Beautiful songs – filthy songs. But haven't you got it mixed up? They didn't ride away from her, they found her near a big wheel that went round and round."

Now she was getting mixed up, so I thought we'd better get down to business.

"When are you – I mean what's wrong with the little white set?"

"Oh, nothing much. It's just that the sound comes on for a second or two and then goes off. Probably something loose."

"O.k. Mrs. Knell. Leave it with us till about five. We'll

make it talk by then."

I could hear Honey Bunch singing softly in the background. "I tort I saw a pussy tat a cweeping up on me." So Mrs. Knell made her graceful exit and I had to explain the whole thing to H.B. "I thought she was Eskimo Knell, but she's only a vampire after blood."

"Don't you worry. The only female that's going to have your blood is me, and if you don't get cracking I'll have it right now."

"You're so sweet" I murmured.

And so I started the long drawn out battle with the Ranger. I removed the rear cover and the aerial panel, slackened the top fixings and the tube base socket, stood the set on its side and gained access to the plug-in i.f. panel – thinking there was a poor edge connector contact. Switch on and the sound comes up loud and clear. Then stops.

I located the intercarrier sound i.c.'s output pin and applied a hum test with my test prod. A loud, clear hum. So the audio output stage was intact. I applied a test signal to the i.c.'s input pin and there was no response. So a new chip was fitted. Not all that simple as there are variants of the TBA120 and the only one I had in stock was of the wrong type. Raymondo was eventually able to supply the correct version (I thought). Still no sound.

I heaved a sigh and started on the tedious business of removing the capacitors around the chip and testing them separately. Two of the 0.02 $\mu$ F disc ceramics showed leakage, one associated with the input and the other with the d.c. volume control. Fit two new capacitors and again switch on. There didn't appear to be any sound until I rotated the tuner slightly. The sound then came in on a knife edge, with a cracked quality suggesting that the quadrature coil L15 needed readjustment. Doing this didn't make any difference. I never thought it would.

So I gave up and refitted the original chip. The sound burst through loud and clear and stayed on. I hate disc capacitors marked 0.02.

Mr. Knell came in at five o'clock. A little grey man. Looked as though he needed a transfusion.

## **Letters**

### **NEON TESTERS**

It is not true that with a neon tester "the only insulation between you and the live test point is the neon itself" (letters, June). When a neon strikes it becomes a virtual short-circuit, the only limit on the current flowing through the user's body being the high-value (1M $\Omega$ ) series resistor in the body of the screwdriver. Without this series resistor, the user could experience a severe if not fatal shock depending on the voltage being tested. The series resistor will provide protection should the type of neon your correspondent regards as unsafe go short-circuit. I feel that these points should be made in the interests of safety.

K. C. Duncan, F.S.E.R.T.,  
Bolton, Lancs.

### **LUXOR AND PHILIPS**

Reference was made in the *Teletopics* column in your May and June issues to relations between this company

and Philips. The discussion to which you refer in your June issue took place many months ago, and I would like to emphasize that the two companies are no longer talking about mergers or takeovers or, as they say in Sweden, "any kind of fusion".

Dennis Swannack,  
Managing Director, Luxor (UK) Ltd.,  
Slough, Berks.

### **WHERE DID WE GO WRONG?**

Your leader "Backing and not backing winners" (June) brought back several recollections. In the late 50s and early 60s for example EMI produced some of the best early computers – I maintained one of them, a hybrid valve/transistor device code named CP407, for two years at British Leyland. We had some funnies due to heater-cathode shorts in the double triodes etc., but the germanium transistors used in the card reading buffer stages behaved wonderfully. The clock frequency was only 100kHz, and the printers and tape decks were weird and wonderful – 4in. tapes and printers run on a system of Bowden cables. We nevertheless managed to do the whole payroll for BL on the machine in the early 60s. The machine was then improved, with much faster card read-

R749 to 680k $\Omega$  and the balance potentiometer R752 to 220k $\Omega$ , results in solid, stable line sync.

Now for some general comments. First, although I agree that a smoothing electrolytic can should be replaced complete I have on numerous occasions fitted separate 33 $\mu$ F, 470V electrolytic capacitors to decouple the 220V supply to the luminance output valve on the CDA panel and the 240V supply to the PCF802 line oscillator on the timebase panel without any problems.

Secondly, taking the earth off test equipment is not the answer to workshop safety – the aerials and many other things are earthed. All workshop benches, or at least the set being worked on, should be fed via an isolating transformer to remove any risk.

Thirdly, I've been covering these sets successfully for many years. If a few rules are followed the results are excellent. First remove all old polish using a foam cleanser, then give all the edges a thin coat of Evostik contact adhesive and allow it to go off – this will ensure no curling at the back and front. There's a contact material available that matches the wood perfectly.

A last but most important point. Many of these sets have been used on stands with the feet removed. If the set is then put on a flat surface without some type of replacement feet being fitted the result will be overheating due to poor ventilation.

*Steven Howard,  
Ashford, Middlesex.*

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# Ripples on the Mill Pond

**Les Lawry-Johns**

IT'S been very quiet around here lately. Not many laughs, but quite a few headaches with some of the sets that have come in. The chief trouble maker at present seems to be the Rank Z718 chassis (Bush Model BC6100 etc.), closely followed by the Philips G11.

## **Mr Nosegrinder's Z718**

Take for example the Z718 Mr Nosegrinder brought along.

"There's not much wrong" he said helpfully. "You're watching a good picture, when all of a sudden it goes down to a short, dark picture – mainly blue."

I closed my eyes in apprehension. Whenever someone tells you not much is wrong, you can bet your life you're in for a nightmare – albeit one probably helped by you not thinking carefully enough about the symptoms. This was a classic case, and I never seem to learn since I made the same mistake later with a G11.

I hooked up the Z718 and studied the picture it displayed. Not much to complain about. Ten minutes later it suddenly went dark and the height shrank to a little over half. My reaction was to assume (wrongly) that there was a fault in the field timebase, and that this was pulling down a supply line going to other sections of the set. The obvious step to take was to check out the field timebase circuit, preferably with a can of freezer since the fault seemed to be heat sensitive.

So I squirted away with the aerosol, first at this, then at that. Output transistors, drivers, amplifiers and oscillator transistors were all subjected to the freezing blast, until I began to feel cold myself. Needless to say it made no difference, so I started to make voltage checks on the output and driver transistors. The voltages didn't seem to be far from what was to be expected, so we moved over to the field scan generator department (another five transistors). The voltages here seemed to be a little on the low side, but the relationships between the base and emitter readings were right. I then switched off and checked every transistor, each one proclaiming its innocence. Switch on again and everything's back to normal, so the transistor checks had been inconclusive. Again the height shrank and the brightness went down.

In desperation I checked the voltages on everything in

sight on the timebase panel – and found a wildly incorrect reading between the base and emitter of 4VT21. Take a look at the circuit and find that this transistor is part of the 12V regulator circuit. Bloody fool! All that mucking about and you didn't stop to think of a possible common cause for all the symptoms. Check both transistors in the circuit and find them to be o.k., though the reverse reading between the base and collector of the regulator transistor 4VT20 wasn't the expected 910 $\Omega$  (4R77). The reading was very high in fact, gradually falling to something like 2k $\Omega$  as the set cooled. So out came 4R77 and as the nearest value we had was either 820 $\Omega$  or 1k $\Omega$ , in went 820 $\Omega$ . The set then worked very well, and continued to work for as long as it was left on.

I made a mental note of that one, but later discovered that everyone else in the world already knows about 4R77 going high in value. Funny that.

## **And the Next Gent Please!**

A Philips G11 was next. Mr Dry Joint himself. The set, not the owner. The symptoms were that the picture would come on all right for about five minutes, then fade – at the same time losing colour. On the bench this was indeed what happened, and we noticed with our eagle eye that the picture also became grainy and the sound went down slightly. "Tuner or early in the i.f. strip" I said, so I checked the operating voltages in the i.f. unit and went over the joints carefully. No joy. Next fit a new tuner. The picture seemed to stay on longer, but faded nevertheless.

I looked hard at the suspect lower panel, and noted the sound output transistors on their heatsinks and the single power transistor below them. "I wonder what you do?" I thought. So I checked the voltages around it and found that they were wrong. Better look into this. It's not a transistor! It's an i.c., type TDA1412 – the 12V regulator. Oh no, not again.

Look around for a replacement, but none in stock. The stock book said no, but it sometimes lies. Anyway we didn't have one, so I carried out a check by bridging it with a 120 $\Omega$  resistor and connecting a 12V zener diode from the low voltage end to chassis. The picture remained perfect, and the rail remained at less than 12V – so the

zener diode wasn't being asked to do anything much, but it was comforting to have it there just in case of a sudden rise. It would have to remain there for only a couple of hours, until I could con someone into nipping out to the wholesalers for me – my friends didn't seem to have one either.

"Hallo Geoff. Have you a 1412?"

"A what?"

"You know. 1412 as in the French retreat from Moscow overture."

"That's 1812 you nuthead."

"Sorry Geoff. What I want is a TDA1412."

"Well I haven't got one and if I had you wouldn't get it. Not after telling that pretty redhead I was queer."

"I meant you were unwell, Geoff, honest."

The phone went down so I tried Raymondo who didn't have one either, which is why we have to go to the wholesalers. O.K., so what have we learnt from this time wasting exercise? Simply that to check voltages approximately is not enough. A fall of something like 2V on a 12V line is enough to affect the whole set badly. A drop of 2V in one stage would perhaps not be noticed, but when all the i.t. fed stages are affected equally a far more dramatic effect is to be expected.

In future I'll pay more attention to the exact readings, even if it means putting on my glasses and taking them off again more often than I do now. We don't want to make any more boobs, do we? Which reminds me that a pretty little redhead is expecting me to call and check her remote control.

### ***The Pub in a Field***

When Mr Piddlewell popped in we thought it was his Thorn 8000 that was giving trouble again.

"Has it gorn again?" we asked, with bitter memories of the set's history of intermittent starting.

"Na. It ain't mine this time. It's a customer of mine out in the sticks." He gave me directions on how to get there, "so that even a fool like you can't get lost." Nice fellow, Mr Piddlewell.

It turned out that our destination was a pub, and the directions sounded weird to me though I knew the locality well enough. It was just that I'd never seen a pub there.

I decided to make an evening call of it (for once), and since it was a pub several miles out H.B. said I wasn't going on my own or heaven knows what time I'd get back home. The truth is of course that she likes a drink and a natter in a strange pub once in a while. So that evening we loaded the van, taking everything we could think of since Mr Piddlewell hadn't bothered to ask his friend what sort of set it was. In went triplers and transformers, transistors and transducers, my case of "get you home" i.c.s, droppers, the lot.

Then down the yellow brick road we went, heading for the rainbow. Down the lower road, through the countryside, skirting the marshes, shouting obscenities at the cows and sheep, scattering the crows and rooks in the road, mile after mile. Over the bridge and straight down the road that doesn't go anywhere. Turn left at the end, down the lane that comes to an abrupt end in a field, or rather thick countryside where horses grazed and ducks splashed about on a reed filled pond, quacking at each other and I think at us.

There was no sign of a pub such as you might expect. Just a sort of outhouse – in the final throws of decay. A

board on the front had been weathered away, but we could just make out some words, or part of them, that said "free house".

"Just look at that" I said to Honey Bunch. "They're so glad to see anyone here they give the booze away."

"You daft bugger" said H.B. shortly. "Free house means they can sell any brand they like – and charge what they like. Anyway, I'll have a Vat 19 and coke to start with."

So in we went and found a rather bare room with one customer at the bar or counter. It just had to be one of our own well known customers. He looked startled to see us.

"Hello Bert" I said. He didn't look happy.

"Of all the bars in all the world, you had to pick this one."

A door opened and closed and who should walk in and up to Bert but the pretty little redhead whose controls I'd played with earlier. I now appreciated Bert's discomfort. His wife is a rather handsome fifty or so. At the same time I had to play my cards right, so I turned my attention to the bar.

"Vat 19 please" I asked the robust landlady.

"Ain't no Vat 19. Only Bacardi. That do?"

O.K. love. With a coke and half a bitter please. And could you put some ice and a slice of lemon in the Bacardi?"

"Ain't got no ice yet. No lemon either."

"All right love. Just as it comes then. By the way, I've come to fix the TV, so I'll have a quick swig and then pop through to where it lives."

"He's watching it at the moment. Smoke and all. Mustn't miss his football."

I could see wisps of smoke coming from the back room, and there was a familiar smell. I went through, half expecting to see a hybrid ITT colour set – the ones that emit lots of smoke from the mains filter capacitor occasionally, whilst still working normally in all other respects. I was surprised to see a Philips G8 however, sitting in the corner emitting smoke from the rear while the landlord sat in front wearing a World War two gas mask.

"Switch the bloody thing off" I bawled.

"Any minute now. Wait for the whistle."

Much to my relief the whistle sounded and I knocked the switch off, at the same time trying to wave away the choking smoke. When I'd taken the back off I immediately saw a black hole in the top winding of the line output transformer, with wisps of smoke still issuing from it.

By this time the old boy (I should talk) had taken his mask off and started on about how quickly the job could be done. "About half an hour at normal rate plus fifteen mintes at double time" I told him. "Don't hurry" he said, "I've some cellar work to do before the next match comes on."

He didn't look much like a publican, any more than his wife did, so I asked him how long he'd had the place? The answer was "four hundred years", which surprised me since I'd have thought three hundred a more realistic estimate. I nipped back to the bar to finish off my bitter before getting the transformer, and found Bert long gone.

"His niece seemed a nice girl" said Honey Bunch.

"Er yes, very nice" I replied, wondering whether I'd misjudged poor old Bert. "I thought it was his daughter."

The landlady put me right. "He came in with his daughter last week. A pretty blond girl."

How does he do it?

# Big Boys Don't Cry

Les Lawry-Johns

"Will you pop down and have a quick look at my set? It's fairly new, so there won't be much wrong with it. As you did my sister's the other week and were there only a couple of minutes I thought I'd ask you rather than take it back to where I bought it. I was watching that John Wayne film last night and was just beginning to enjoy it when the set went off."

I scowled at the phone. What she really meant was that I hadn't charged her sister very much since she was getting on a bit, and now she wanted the same treatment. Oh well. So I agreed to call as she had no transport and later that afternoon I arrived at her flat. As she let me in she started off again.

"Just as I was enjoying that John Wayne film, off it went. Makes you sick the way these things let you down just when you're enjoying a film. It's as though they know. Ha, ha."

## Battle with a Pye 184

I made my way to the set, which was a Pye Model 184 – solid-state monochrome 176 chassis with 24in. c.r.t. A set in fact with which I'd rarely tussled. It was on a stand, and had about twenty thousand ornaments and photographs on top. She collapsed into an armchair and fanned herself with a book. I wasn't going to get any help with the clearance then. I started to remove the paraphernalia, and in doing so accidentally dropped an ornament that wouldn't be damaged by the fall.

"Oh dear!" She shot out of the chair and the top of the set was clear in no time. "You really must be more careful – these things are precious to me."

"I never could be trusted to clear the top of a telly" I admitted.

"I hope you're more careful with the inside" she commented.

"I usually muck up more sets than I mend" I cheerfully assured her. I then removed the rear cover (sliding a screwdriver into each slot fastening) and peered into the interior. A vertical printed panel surrounded the tube, held vertically by two side plastic clips. The panel flopped down when the clips were released, revealing two wirewounds (lower centre) that had sprung their thermal springs. Without the circuit I assumed they were in the feed to the line output stage. My spirits sank: no quick job here.

"Have you done it?" the lady enquired.

"No I bloody haven't" I muttered. I hooked up the soldering gun and repaired the two springs, then on second thoughts unsoldered them to check for shorts. There didn't appear to be any, and as the BU205 line output transistor seemed to be o.k. I once more soldered up the springs and applied the mains. The sound came through and the lady beamed. I waved my neon over the line output transformer and it glowed – but only just.

I looked at the screen with the brightness turned up and there was just a dull glow there also. The e.h.t. rectifier is of the stick type, so I switched off, removed the end cap and tried again. The neon didn't respond any better, and I was aware of heat coming from the line

output transformer's overwinding, accompanied by the smell one gets from overheated plastic. The lady must have been watching my face rather than the set, because she knew the news would be bad.

"Will you have to take it away?"

I nodded. "It wants a new transformer and I haven't one with me. There isn't one at the shop either, so I'll have to send off to Philips for one. That means it may be away for quite a few days."

"Oh. Then I'll have to watch my sister's. It was a good job you were able to do her's, wasn't it?"

## Back on the Bench

So I hauled the set back to the shop, where I stupidly had another go at it instead of leaving it till the transformer came. I had Sam Magrew's Bush in mind, the occasion when we lost three transformers in a row, and didn't want a repeat performance. Also upon looking at the circuit I couldn't quite see why the second wirewound resistor should have gone open-circuit – it was in the feed to the line driver stage, the other one being in the feed to the line output stage. R615 (6.8k $\Omega$ ) and R631 (82 $\Omega$ ) respectively. So I checked the line driver stage carefully, but couldn't find anything amiss here. Whilst in the area I again checked the line output transistor, and was amazed to find that it was now short-circuit. It certainly wasn't so in the lady's flat, so why now? Had the hot line output transformer administered one parting slap in the face before R631 sprang open again, or was there something more sinister here? How could I check without the new transformer?

So I disconnected the overwinding at both ends and made a note of the line output transistor connections – white to the collector, grey to base, red to emitter. With some difficulty I removed the faulty transistor and fitted a new one – leaving three on the shelf with a similar number of BU208As. After making sure that there were no leaks, I switched on and checked the supply voltage at R631: 70V where there should have been 200V or more. I switched off before R631 could spring, and checked the line output transistor. It was short-circuit and the overwinding was still hot, even though disconnected. It would have to come off.

Removing the transformer was easy, removing the overwinding was not. Eventually, by fair means or foul, the winding was rendered impotent (which makes two of us, though I have high hopes of these heart pills I've been swallowing of late). Again with difficulty I fitted another line output transistor, and just to be on the safe side I clipped a wirewound of some 300 $\Omega$  in series with R631. Everything was in place, including the bare looking transformer, and with some optimism I switched on. Clonk. Another dead line output transistor.

Panic set in. Obviously someone up there didn't like me. So I put the set to one side and repaired a couple of sets that had been waiting patiently for attention. They were both despatched in minutes, which meant that in no time I was back to the horrible Pye. I thought I'd better think.

I thought long and hard but I couldn't make any sense of it, partly because I find it hard to think straight and partly because I haven't much sense anyway. So I wearily swung down the panel and looked at the shorted line output transistor. I looked again and then shone my little torch on it. What was that grey lead doing on the collector, and more ominously what was that white lead (h.t.) doing on the base? Surely I couldn't have been such a fool? Yes I could, and heaven only knows what might be wrong now.

I decided to adopt a different approach. The line output stage circuit is shown in Fig. 1, and as can be seen the line output transistor's emitter is connected to the 35V rail. This supply is provided by rectifier diode D631, which rectifies the voltage developed across winding 6-7 on the line output transformer to produce 35V across its reservoir capacitor C626. 12V and 22V supply lines are derived from the 35V supply, the former being stabilised by transistor TS301. If something linked to the 35V line was the cause of the trouble, we could apply an external 25V supply and monitor the current without the need for the line output transistor to be connected. This we did, and after a lot of unhooking this circuit and that we discovered that the 12V regulator transistor TS301 (BC328) was playing about.

A replacement was fitted and the circuit was deemed to be in full working order. Another line output transistor was put in and correctly wired. Some 600 $\Omega$  worth of wirewounds were inserted in the h.t. feed to the line output stage and the set was switched on. The tube heater lit up (much to my surprise), indicating that the line output stage was at last functioning correctly, even at this reduced power. So we took out some of the wirewounds, leaving about 200 $\Omega$  in just in case. The line output stage continued to work, so we took out the rest and soldered the spring of R631. We were still left with no e.h.t. of course, so we tried a couple of experiments with a five-stick tripler. As the results were disappointing, we resolved to await the arrival of the new line output transformer from Philips.

There is one point not so far mentioned. When we applied the 25V to the 35V line for test purposes we also loaded the h.t. supply to the line output stage (with the transistor disconnected), using a 40W light bulb to simu-

late the line timebase load. We did this so that we could monitor the h.t. voltage, which was high and not adjustable (R312, labelled width) until the 12V regulator transistor had been replaced – the 12V regulator, the 35V supply and the h.t. regulator circuit are linked. Once the 12V regulator transistor had been replaced we were able to adjust the h.t., thus making our little light get brighter or darker as the voltage varied between 180V and 240V. We set it for the correct 220V.

When the transformer arrived we fitted it and the set performed quite nicely. We returned it to the lady who had broken quite a large number of the china ornaments that had previously adorned the top of the TV set. This was a blessing in disguise we said, since a lot of bits and pieces on the top of a TV set tend to make it go wrong more often . . .

I've condensed this little story into a few words, but in reality it caused me any amount of heartache and a fair amount of expense – I lost more line output transistors than actually mentioned. I felt like crying.

## Errant Chips

Hard on the heels of the Pye came a Bush set fitted with the T22A chassis – the one with the surface-wave filter and TDA2540 i.f. chip. The complaint was that reception would be perfectly acceptable for some time, after which the picture would fade with loss of colour. The sound and vision would then be completely lost for a period which varied. On test the fault didn't show up for quite a time. The symptoms were then as described – first loss of contrast, then excessive noise followed by complete loss of signals.

I first suspected the 12V regulator, since we've had trouble with the 910 $\Omega$  resistor in this circuit, but a quick check revealed that all was well here. So we checked the voltages around the TDA2540, and found a wild variation at pin 4 (tuner a.g.c. output) where the voltage rose to 8V as the signals faded out. We had one TDA2540 on the shelf, and this was fitted after removing the signals panel and inspecting it closely for any dry-joints etc.

The board was replaced, and we confidently viewed the picture. Like a rock it was, perfect. For a time that is. Then it started to fade again to suggest that we'd made another hasty and inaccurate diagnosis. The voltage at pin 4 was still varying – probably trying to make up for the lack of signals due to a fault in an earlier stage I thought. What precedes it? The tuner, a two-transistor preamplifier, then the SWAF. The two transistors checked out o.k. and I was not inclined (didn't want) to suspect the filter. So the tuner was the obvious suspect (to me). Out again came the panel, and in went another tuner. Again we had high hopes: again they were dashed after two hours.

I then grabbed the hairdryer and freezer and played for ten minutes. The conclusion was beyond doubt. Everytime the TDA2540 was sprayed, the signals returned as good as gold. I searched the shelf but there was no sign of a TDA2540. So I phoned my friend Geoff of Moon Lane and he said "rest in peace my son, for I have two." Off I went on my little roller skate (Renault 5) to see him. When I got there he was in trouble with an ITT CVC30. He was still in trouble when I left, because he said my remarks added to the confusion. I had my chip however, and lost no time in fitting it. This time we were rewarded and the gain stayed steady despite lots of heat and cold.

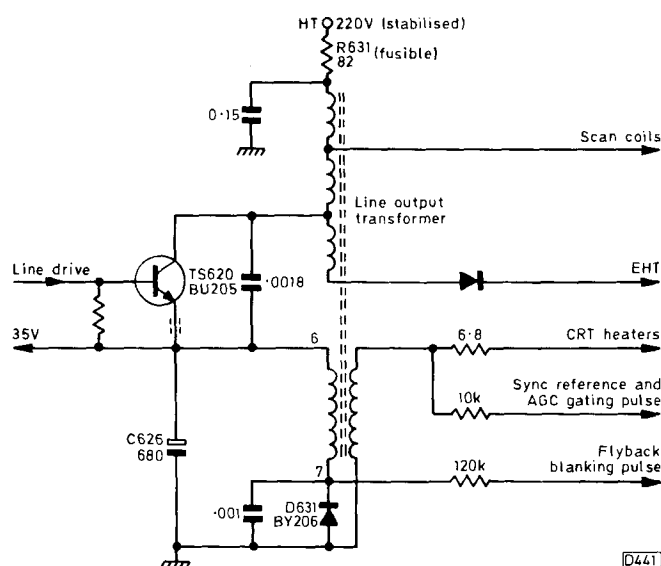


Fig. 1: Line output stage circuit used in the Pye 176 solid-state monochrome chassis (version with A61-520W c.r.t.).



# Hey Constable!

**Les Lawry-Johns**

WE were snoozing peacefully at 04.15 the other morning. Our dreams were then interrupted by this earsplitting crash of broken glass. A horrible noise, difficult to describe and a bit frightening. "That bloody cat" I moaned.

"It's not the cat, it's the shop window" H.B. bawled, reacting quicker than me.

Rush down the stairs and switch on window lights. Just reaching the front door when I realise I'm stark naked (hot night). H.B. now at bottom of stairs with towel wrapped round her. Grab it – quicker than you could unveil a statue of Venus – and wrap it round lower regions. Open shop door and peep outside. No one to be seen. Whoever had smashed the window hadn't hung around for long and was nowhere in sight. Look at main window. Large hole on left side and scene of utter devastation inside. Large double housebrick lying amidst pile of broken glass and shattered display stands. It appeared that a portable TV set was missing.

"What did they get?" asked H.B., now decently done up in her dressing gown.

"The daft buggers have only taken a monochrome portable. Hardly worth the effort" I said, checking to see that the remote control colour portable and the other more important items were still there.

H.B. went to phone the police whilst I dressed and got out the car to take a quick tour round, looking for any likely suspects on foot. Not a soul of course, so back to the shop to find that the police had arrived and were taking notes.

## Getting the Facts

"Thirty eight, twenty four, thirty eight" Honey Bunch volunteered. That got me a bit as I couldn't quite see what her vital statistics had to do with it.

"They grabbed a portable TV, not my wife" I told the young officer.

"We have to have all the facts sir. Er, how old was the set?"

"How old! It'd only just been born, that's how old it was."

"Oh I see. It was new then?"

"It was new till that bloody brick hit it. I don't suppose it looks all that new right now. I've the make, model and serial number if that helps."

"Ah yes. Of course. Now how old are you sir?"

"Ninety four. What's that got to do with it?"

"Must keep a complete record sir. Now, do you keep a dog?"

"Yes, but he's not all that brave. Hides away if there's a loud noise. Only thing that upsets him is when someone stands on his mat. He bites them."

"Which mat is that sir?"

"The one you're standing on. I'll call him so that you can take a look."

"Please don't bother. Well, that's about all. If you find out who did it, let us know." And off he went.

Left alone we cleared out the window, swept up the debris and tidied up generally, waiting to get in touch with the glaziers who, bless them, had a new window fitted by mid-day.

## Italian Interlude

My friend Geoff sold a TV set to an Italian family that lived nearby. They saw it working and paid the money, then popped it into the car and took it home. That same afternoon the lady returned waving her arms in the air. "Set no gooda. No goodatall. You owe me twelve pounds fifty. I take it now."

Well. Why twelve fifty? The set had cost a lot more than that. When the lady stopped bawling, Geoff ventured to ask.

"Because the set no go I kick electric fire. Now he no go. Cost twelve pound fifty to repair. Hur?"

"You kicked the fire, you pay for it. We'll pop round and fix the set for nothing, all right?" bargained Geoff.

Eddy looked up from the workbench and Geoff nodded to him. Eddy takes over. Soothing Eddy. Smarmy sod. Had the woman eating out of his hand in half a minute. Whipped her round to her house, retuned the set from London to Bluebell Hill in thirty seconds and stayed for two hours. No more mention of the fire. I could do with a bloke like that. On second thoughts, perhaps not.

## A Couple of Deccas

I'm not well acquainted with the Decca colour portable (70 series chassis), so when Len brought his in for me to look at I was a bit wary. He's one of our local characters, an electrician by trade. So I guessed he'd already been having some sort of a go at it. I normally only see him in the local when we (me and the dog) pop in for a quick one after our walk. This is early on in the evening, about six thirty, but by that time Len is usually sloshed. It was fairly early in the morning when Len arrived, sober (I think).

"It used to go when I hit it. Now it doesn't. There's obviously a dry-joint" diagnosed Len.

"What did you do to it?" I asked carefully.

"Well, as the picture went off but the sound would stay on till I hit it to bring the picture back, I thought the trouble must be in the tuner."

"Well I never. Brilliant. What did you do next?"

"Took the tuner out. When I put it back there wasn't any sound either."

The chassis swings up. So we did this and took a look at the tuner. It plugs into the panel, and it's possible to plug it in wrong. Not easy mind you, but Len had managed it.

So we took it out and had another go, finally refitting the clip to hold it in position. We now had sound but no raster, due to the line output stage not working. Slight pressure on the line output transistor subpanel restored normal operation, and inspection revealed that the panel could move independently of the transistor which was soldered to it. Resolder the base and emitter legs to the panel and there we are.

"Wife will be pleased" said Len. "She goes to bed early and this keeps her company."

"You don't get home till late then?" I said by way of conversation.

"Most often don't get home at all" said Len. "Usually sort of fall asleep in funny places."

So Len wandered off, leaving me to reflect on the odd

lives some people live. I couldn't ponder long because this young chap brought another colour portable in. Just had to be a Decca 70.

"It sort of went off" he explained. "Mum said if you hummed and harred about doing it, take no notice, just leave it for you to play with."

"I'll play with her if she talks like that" I threatened.

"That's what mum said you'd say. Mum's name is Joyce."

"I see. Yes well leave it for a couple of hours and I'll see what I can do. Give your mum my regards."

Fancy Joyce talking to her son like that. Let's see. How old would he be now? Well, must try to help the lad. Nice looking boy that.

So we looked at the Decca and didn't have to look far. The focus lead from the tripler was welded to a 27 $\Omega$  wirewound which didn't look too happy with the wedding. It was just a matter of re-insulating the focus lead, dressing it away from any warm parts and replacing the 27 $\Omega$  resistor, hoping that no other damage had been done.

Fortunately nothing else had been affected, and a nice picture was produced.

### Another Constabulary Visit

In comes this good looking fellow. Introduces himself as Don Clark, Inspector (technical) with the county police.

"Calling about the smash and grab?" I asked.

"Heavens no. Don't deal with that sort of thing. Technical, electronics and all that stuff. You must come and see our headquarters. Think you'd find some of the things we've got interesting."

"I'd like that" I said, wondering what might happen if I paid a visit to the police headquarters.

"Just passing by and thought I'd pop in to say how much I enjoy reading that magazine of yours. That chap Chas E. Miller kills me. Really does."

"He and his friend Ike Hodge kill me too" I said. "Pop in again next time you're passing Don."

# Focus on Portables

## 1: IF and AGC Circuits

George Wilding

MONOCHROME portables from many countries have been imported into the UK over the past decade, and there is great diversity in the circuitry they employ. To start with, the tuner units: though the varicap type is now the norm – there are still some current models that use mechanical tuners – quite a variety of different types of mechanical tuners are to be found in earlier models. Many use a diode mixer for example, while the simple tuner unit used in the Sony TV144UK dispensed with an r.f. amplifier stage, incorporating just a diode mixer and a transistor oscillator. This was followed by a two-stage, wideband i.f. preamplifier.

The i.f. circuitry employed is also diverse. You may find a couple of chips preceded by a bandpass filter, a single chip preceded by a SAWF and its driver, a discrete component i.f. strip or, as previously mentioned, a transistor i.f. strip preceded by a preamplifier. Whilst the conventional diode is the usual type of vision detector employed in discrete component i.f. strips, it's not uncommon to find that a transistor is used for this purpose.

### Interstage Coupling

Where discrete component circuitry is employed, many different collector load/interstage coupling arrangements are to be found. Coupling involves providing a good match between the comparatively high output impedance of one stage and the much lower input impedance of the following stage. Tuned transformers employing a suitable step-down ratio will meet this requirement, but tuned coils with impedance matching by means of a couple of capacitors or even just one capacitor are equally popular. Alternatively the coil may be tapped.

Fig. 1 shows the basic idea of capacitive impedance matching: the coil is tuned by C1 and C2 in series, the ratio of C2 to C1 determining the degree of coupling to the following stage – the larger the value of C2, and thus the lower its reactance at the signal frequency, the more

closely the tapping point approaches the live end of the coil. By the latter we mean the collector end, since the other end is decoupled by C3. Because of the latter condition, identical results would be obtained by connecting the capacitors between the collector of the transistor and chassis.

When only one capacitor is used to couple the signal to the following transistor, the latter's input capacitance may act as the second capacitor in the coupling/matching arrangement. Transformers and coils are commonly damped with a resistor to broaden the bandwidth – on occasion you may even find that RC coupling is used.

### Neutralisation

Whatever is done earlier in a discrete component i.f. strip, the final stage is usually transformer coupled to the detector. Neutralisation is also commonly employed in the final i.f. stage. The reason for this is that the types of transistor used in the final i.f. stage tend to have a larger feedback capacitance, whilst as the signal is at maximum

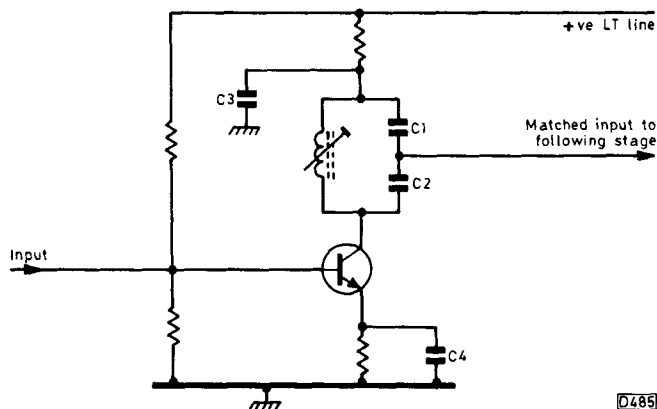


Fig. 1: Capacitive impedance matching between stages.

# Spider Walk

**Les Lawry-Johns**

ONCE upon a time we would carefully unpack new sets, run them up and align the channels as soon as they were delivered. Having satisfied ourselves that all was well we would return them to their boxes until needed. Until recently, that is. Of late we've become lax and left them in their boxes – simply because their track record has been so good.

So in came a couple we knew quite well. They wanted to buy a new set but hadn't quite made up their minds. They said a plain 22in. set would do. So I showed them a Pye set fitted with the K30 chassis and they were quite happy with it. I then put my foot in it by suggesting one with remote control, to save them jumping up every time they wanted a different channel or wanted to alter the volume etc.

They said this was a good idea so I unpacked a nice new 1042T and put it up on the bench. The little light came on to say that all was ready, but when I pressed channel one the light went out and the set was stubbornly dead. It remained so even after I'd switched off and on again. Even the little light now remained out.

That's funny I thought, and then noticed that the front panel was loose. Off with the back cover, revealing little bits of plastic on the floor of the cabinet. It had apparently sustained a mortal blow somewhere along the line, and I cursed myself for not having checked it earlier. The couple settled for the one without remote control however, and departed quite happily whilst I repacked the damaged set for return to the wholesalers. During this procedure H.B. came downstairs and stood beside me.

"I think you should go to the bathroom" she said.

I sniffed but found that I was still my usual pleasant self. H.B. sighed. "I don't mean you need a wash you fool. There's an enormous spider in the bath and I can't get it out."

So after I'd packed the set I went up to the bathroom to carry out a rescue operation. The usual process is to drape a towel over the side so that the spider can climb out. Must help them otherwise we'd be knee-deep in other insects. When I saw the size of this one however I was quite amazed: it's body was the size of a peanut, with legs sticking out three inches on either side. When I say a peanut I mean a pair in the shell, not one of your shucked variety. No indeed there was nothing small about this fellow (or girl) and it refused the invitation when I slid a towel down towards it. So I moved the towel round to the other side and tried to drive the ungrateful beast on to it.

It didn't want to know, so I left it too take its time. A while later I found that it was still there. Maybe it was tired out after trying to climb the sides of the bath unaided. I pondered: should I insist on it going up the towel and possibly hurt it, pick it up and risk it hurting me, or feed it some dead flies to give it strength? I decided to pick it up and risk instant death. Up by the legs and out on to the window sill. It would have to take its chance, jumping or climbing down the wall. Shut window and put towel back.

What's this? Three tiny specks scurrying around in the

bath. Looking for mother? Now what had I done? Something had to be done about this and quickly. Fortunately mother spider hadn't made her departure, and with the aid of a piece of toilet paper I was able to get her back into the bath.

I expected the little ones to rush towards their mum, but they didn't. In fact they scooted as far away as they could get. Then another thought hit me. Maybe it was dad. Do the fathers eat their young? Were these the final survivors? There was only one solution, to rescue them all but separately. This was easy enough with the big one, but the others scampered about everywhere. I eventually got them all out, but what subsequently befell them I shall never know.

## **The White GEC**

After this harrowing encounter with the animal world I staggered down to the shop to harrow with humanity again. I didn't have long to wait. In came a young chap carrying a monochrome GEC set in a white cabinet – a Series One type.

"The tube's knackered" he informed me.

"Oh, ah" I said for want of anything better to say whilst removing the back.

"Yes indeed" he babbled on. "When it's going there's a blue light in the back of the tube."

I asked him if it was in the tube's neck and he said it wasn't. It was up the front where the scan coils meet the tube bowl.

I switched on and after the line timebase had warmed up I noticed that a raster appeared. "There it is, just above the coils" he said. It was a reflection from the screen through a section of the bowl with no coating of course. So I turned the brightness down and the glow vanished. "It's gone" he said.

Connect aerial and turn brightness up again. The line hold was way out, but trying to correct this by adjusting the line oscillator coil pulled the picture sideways in fine lines, with the hold still poor. Time to check likely components. The sync separator's 47k $\Omega$  screen grid feed resistor was o.k., as were the flywheel line sync discriminator diodes and the 100k $\Omega$  reference pulse feedback/integrating resistor. The PCF802 perhaps? What's this – a PCF801!

"Who put that in?" I demanded. Said he didn't know. Anyway a new PCF802 and adjustment of the coil set things to right, and the young man departed still wondering where the blue glow had gone.

## **The White Murphy**

The owner of a white Murphy complained that the fuse must have gone because it didn't do anything. Also that the Channel 4 button wouldn't get Channel 4. It was a standard A823 chassis.

The tube heaters glowed and there was h.t. at the top fuse which was intact. The l.t. fuse was also intact, but there seemed precious little l.t. from the bridge rectifier, suggesting either that the bridge was at fault or that the reservoir capacitor wasn't reservoiring. The bridge (a BY164) measured o.k. when checked with the meter, so we removed the top plug and checked the reservoir capacitor via pin 5. It too read right so we decided that the bridge wasn't telling the truth. We fitted a BY225 in preference to four separate diodes – because the BY225 is quite adequate for the job and is easier to fit. The l.t.

was then correct, but as there was a suspicious and leaky bulge in the centre of the double smoother another one went in.

We could tune in three buttons, but the bottom one seemed too free, leading us to believe that it had shed its collar. Removing the tuner revealed that this was so, and that the three spindles that did work didn't have collars that fitted snugly – there were fine hair cracks in them. So we removed the front plate and fitted four nice new blue collars, assembling the spindles so that the springs didn't get caught in the rear holes.

The set was then ready for use, complete with a Channel 4 button. The owner was quite pleased with our efforts, and rounded up the bill by an extra 51p to prove it.

### ***An offer we couldn't refuse***

A well known motoring organisation regularly circulates its members with offers of publications, accompanied by various enticements. Some of the publications are well worth having, and on this occasion the book was one I'd have ordered without the added inducement of a Ford Granada to a lucky person plus thousands of pounds if an early order was received. This suited me down to the ground, because we badly needed a new car and the money would come in handy to buy petrol for it. So I sent off for the book without delay and told Honey Bunch that our days of running around in a rusty old car were over.

Time went by and we received a card saying that there was a slight delay in sending out the book but to be patient. So patient I was and the book finally arrived. Very good it was, picturing and describing most parts of the country worth picturing and describing. There was no mention at all of our locality therefore, and I wondered about that.

I was still agog about the opportunity of that top of the range Granada. As the weeks went by however I was forced to the conclusion that I'd been forgotten, and when my foot went through the bottom of our car I was reluctantly forced to buy another one – with a bit of help from the bank.

A few more weeks went by and I received a letter to remind me that I'd not paid for the book. This was quite true: in the excitement of waiting for them to send me the car and a lot of money I'd quite forgotten to send them a cheque for the book. So I wrote and told them that I'd forgotten but so had they, and that I was quite upset because I had needed the car quite badly. I haven't heard from them yet, but I really will send them a cheque in due course to further increase the overdraft. I wonder if someone else got the car and money? Something else we shall never know.

## **FIELD OUTPUT TRANSISTORS**

In S. Simon's article on the GEC C2110 series solid-state colour receivers (July issue) the BD203 was suggested as a suitable replacement transistor for use in the field output stage. In the original circuit two different types of transistor (generally ON447 and ON448) were used, and it should have been made clear that the BD203 can be used in either position. In fact the BD203 can be used generally as a reliable replacement in this type of two-transistor class A field output stage provided the mounting arrangements are suitable.

# next month in

# TELEVISION

### ● THE PHILIPS CTX CHASSIS

Models fitted with the new Philips CTX colour chassis are now being released. The chassis was developed at the Philips research and development headquarters in Eindhoven to take advantage of the latest TV technology. The single board is about the size of a sheet of A4 paper and the component count is down to 386 – a third less than previous Philips sets. Next month we review the technical features of the chassis.

### ● TV COMPONENT DISTRIBUTION DIRECTORY

Our first tabulated directory of TV component suppliers. Provides a quick reference to sources of the components you need.

### ● VCR SERVICING

So far we've been dealing mainly with the original basic JVC machine. Next month we go on to the JVC/Ferguson HR3660/3V16 to see the changes required to provide extra features – still pictures, slow motion and double-speed playback. Amongst other things, the off-tape reference pulses control the capstan instead of the drum servo.

### ● ROUTINE TV RECEIVER TESTS

S. Simon on the 18in. Pye/Philips colour chassis – the 713/570 series.

### ● THE FINISHING TOUCH

An otherwise sound set can be let down by the condition of its cabinet. Tony Thompson on simple, practical methods of enhancing the appearance of sets.

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# *The Adventures of Tiny Tim*

*Les Lawry-Johns*

## ***The Awakening***

It was Tiny Tim's turn to get up first. So he rubbed the sleep from his little eyes, tumbled out of bed and set about making breakfast for the dog, his wife and himself, leaving the cat till later as she doesn't like Tiny Tim feeding her. He's often bad tempered in the morning, and has been known to kick her.

## ***The Breakfast***

He put the crumpets under the grill, filled the kettle and plugged it in, then prepared the scrambled eggs the way the dog likes them. Beat up the eggs, add a little milk, grate in some cheddar cheese and add vinegar, salt and pepper to taste. Slice a couple of tomatoes and put under the grill with the crumpets. Turn the crumpets and stir the scrambled eggs in their little saucepan.

Take out crumpets and butter them. Spread with cheese spread and return under the grill to brown. Make the tea and wonder what the day will bring. Look at headlines in the morning paper and realise that the scrambled eggs are burning. This didn't upset Tiny Tim since it gave them a nice nutty flavour which the dog liked.

Out with the crumpets, all sizzling on their plates. Cover with tomatoes scraped from their skins. Cut into sections so the dog can eat them better, and cover with scrambled egg. Leave the dog's to cool, pour out tea, take wife's breakfast upstairs and return to find letters on the mat. Tiny Tim gave the dog his breakfast whilst opening the letters and sipping his tea. About to start eating when there's this knock on the door.

## ***The Intruders***

"We're not open yet" bawled Tiny Tim.

"I know, but I'm on my way to work and can't call later."

So Tiny Tim opened the shop door and a man struggled in with a 26in. Philips G11. "Buttons won't stay in mate."

As he was going out, a lady pushed her way in holding an old Morphy Richards iron with two inches of lead coming from it. In her other hand she held about a metre of unsuitable cable.

"I'm going down town shopping so I'll leave this with you. Just put this lead on the iron and I'll collect it on the way back."

Now Tiny Tim is normally a very obliging fellow. But as the cat will tell you he's often nasty first thing in the morning, especially if he hasn't had his breakfast.

It wouldn't be right to tell you what Tiny Tim told the lady to do with her iron, but she left in a high old huff to spend the rest of her days spreading evil rumours about Tiny Tim and his rotten little shop.

## ***The Walk***

So Tiny Tim locked the door and returned to his kitchen. The crumpet was cold and if there was one thing he didn't like it was cold crumpet.

It was then time to take the dog out for his walk. The cat was outside, waiting for them to go so that she could jump in through the window and scream her orders at Mrs. Tim who was already on her way down having been thoroughly upset at Tiny's outburst at the poor innocent woman who would never darken their door again. She was in time to see Tiny Tim over on the green, chasing after the dog who was being chased by a cat he'd accidentally disturbed, being short sighted as he was.

The cat eventually gave up as he wasn't a good runner – he seemed to throw his legs out sort of sideways, scattering along rather than running, as most Siamese cats are in the habit of doing.

Tiny Tim and the dog resumed their normal walk and took a sniff around the large block of flats at the rear of which stood a row of parked cars. One caught Tiny's eye. A Hillman Hunter that appeared to have a list to starboard.

The rear off-side leaf spring's going thought Tiny, with his habit of getting everything wrong. Still gawping at the car he walked straight into a rain filled pot-hole he'd been carefully avoiding for months. "Oh dear" cried Tiny. "Why don't I look where I'm going?" His little feet felt most uncomfortable for the rest of his walk home, where there was a lot more work waiting for him than had been there ten minutes before.

## ***The Letters***

First Tiny browsed through the letters that had been delivered earlier. One was from the insurance company that had paid for the front window smashed a couple of weeks previously. They thought the cost of the replacement window had been excessive and wanted an estimate for the entire shop front. Probably so that they could put up his premiums Tim thought gloomily. He worked out what he'd paid over the last few years and thought what a handsome profit they still had. But the fact remained that they'd asked for this estimate.

So Tiny went round to the nearby builders and had a chat with them. They didn't know and talked about brick work as well as windows. This made Tiny think about a bloody great big lorry rushing into his shop front out of control, demolishing the shop and all those inside. Tiny Tim shivered and made his way back, feeling worse than ever.

## ***The Estimate***

An old boy came in and asked for a battery. He'd worked for the builders years before so Tiny asked him how much house bricks were. "Ninepence each" the old boy remembered. Later Tim went out front and counted the bricks in twelves. He'd two reasons for doing this. First he couldn't bring himself to say the number that follows twelve. Secondly twelve ninepences make nine shillings, making his calculations easier since all he then had to do was add the cost of a bag of cement and some sand which he could get from the beach at Ramsgate in the summer.

With the figure for brickwork worked out, Tiny added

the cost of the window and half again for the smaller one. This gave him the estimate the insurance company wanted. He carefully sent this off in an envelope and hasn't heard a word since. He could now tackle the jobs.

### **The G11**

First the G11 which he'd forgotten about. After thinking for a bit he remembered that the complaint had been about buttons that wouldn't stay in. Tiny took out the selector unit and stripped it down. The spring that tensions the clicker plate was broken and Tiny Tim didn't have one. What was Tiny to do? He decided to make a replacement out of one of the loose coil springs Bush tuners used to have behind the buttons. It took Tiny an awfully long time to do this simple job, but then it always does. It worked however and Tiny Tim was quite pleased with the result. Except that the picture had bowed-in sides which the man hadn't mentioned. Shining his torch on the line output panel, Tiny looked and looked for ten minutes before he saw it – the dry joint. It was in the most obvious position and looked like the top of a volcano.

### **The Cassette Recorder**

A lady then came in with a mains/battery tape recorder which she said didn't work. Tiny Tim plugged it into the multiway socket and pushed down the play button. Nothing happened so he thought he'd start at the beginning and check the continuity of the mains transformer primary winding etc. by connecting his ohmmeter across the pins of the mains plug. He removed the plug from the multiway socket and put the test prods across it. There was no reading at all, so the fuse, lead and connections would all have to be carefully checked. First he stripped the plug to test the fuse and leads. He thought there was something familiar about the plug, but then one plug looks pretty much like another so Tiny persevered.

The fuse was intact and the connections good, so Tiny whipped the back off the recorder and proceeded to check from the input socket to the transformer, which proved to have continuity after all. Tiny Tim frowned and this made him look old. He caught sight of himself in the bench mirror so he stopped frowning quickly. He would now have to check the lead and socket. So he pulled on the lead and up came his Weller soldering iron, which of course had continuity only when the trigger was pressed. No wonder the plug had looked familiar!

Tim was really cross with himself over this. No wonder all those remote control TVs confuse him when he keeps doing such silly things. Having identified the correct plug, Tiny found a lead disconnected. So he put the back on the recorder and checked with a tape in it. The machine worked all right and as it had a radio section Tiny tried this just to be sure. It didn't work. Oh dear.

With the machine still switched to radio Tiny pressed the play button. On came the radio. This made Tiny Tim even angrier, and he swore as he once again removed the rear cover. It took a long time to trace the supply leads, as there was no voltage at the radio switch. Tim was patient however and traced them down to another little switch marked "sleep". When this was operated the radio worked normally without the play button pressed, and Tiny remembered how he had demonstrated this sleep facility to a lady only the other day – so that she could lay in bed and doze off safe in the knowledge that the radio would switch itself off when the cassette came to an end.

Once again Tim had been caught out by a silly thing. "Coffee" he bawled in a loud voice as he put the cassette recorder back together again for the second time, reflecting on how much time he'd wasted. His New Year's resolution must be to be more sensible and to think more logically. But how was he to do this?

Perhaps he could buy a book like the one called *Thinking to Some Purpose* he'd read years before but never understood. The trouble was that he now didn't seem to be able to understand anything the least bit complicated. Look at his performance the other day when he delivered a new TV set to a customer and demonstrated it. The other lady in the house said she couldn't get channel 4 on her set, so Tiny had volunteered to tune it in for her.

### **The Grundig Portable**

The set turned out to be a 16in. Grundig colour portable that Tiny had never seen before. There were no friendly knobs for him to twiddle. He asked if the instructions were available, but when Tim looked at them he couldn't make head nor tail of the words despite their being in English and designed for customer use. He eventually found a flap on the front. This concealed a little switch which when it was up pointed to three buttons with arrows on them and when it was down pointed to another three, one marked M. The arrows seemed to indicate some sort of search, so Tiny presumed that when the switch was up you could search one way or the other through the channels. Whilst he was pondering upon this a small boy came in.

### **The Small Boy**

"What's up auntie?"

"The man is trying to tune in channel 4 for us, but he can't quite understand it."

The small boy picked up the remote control unit which Tim hadn't noticed over on the armchair. He pressed a button, then went over to the set and pressed search. BBC-2 came on and went. Channel 4 hove into sight and the little horror pressed the M button.

"O.K. auntie. It'll be all right now. Can I have an apple?"

Tim slunk away and wondered what all his years had done for him and how little boys could understand at a glance how complicated things worked. I bet he couldn't handle a T20 thought Tim viciously.

### **Mr. Styles' New Set**

Mr. Styles is a nice man who lives at the top of Telegraph Hill. This means that he has superb reception. He popped in last week to buy a clock radio and to say that he would be back for a 26in. colour set later in the week. When he came back we had a nice new Pye 26in. set ready for him.

We showed him how it worked and how to change channels to take advantage of his position. He took it off whilst we completed the four year insurance etc. A few days later he returned to say that his reception was terrible. We checked the set and came to the conclusion that the U321 tuner was responsible. So we fitted a new one and everything was fine. When we opened up the faulty tuner we found that it had received previous attention. In a new set!???

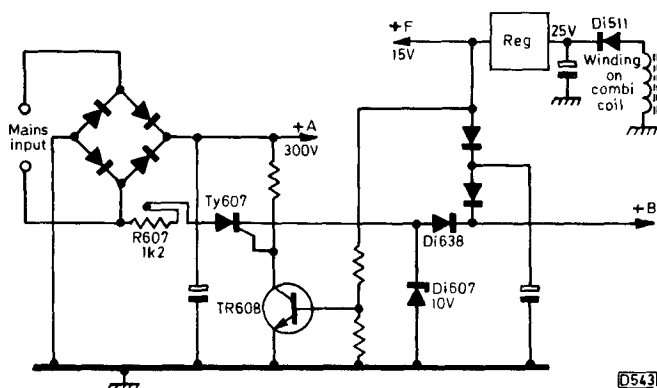


Fig. 3: Start-up circuit used in the Grundig GSC100 chassis. When the line output stage comes into operation the +F supply is developed and TR608 conducts, shorting the gate of the start-up thyristor Ty607 which thus switches off.

6415, etc.) the start-up feed for the line generator comes from the mains bridge rectifier via the fusible resistor R607, the kick-start thyristor Ty607 and Di638 (see Fig. 3). This supplies the +B line until rectifier Di511, which is fed from a tertiary winding on the combi coil, starts working. The isolating diode Di638 is then reverse biased. If R607 is found to have sprung, check Di511 for being either short-circuit or open-circuit – either condition will delete the +F supply and cause a sustained current flow in R607.

### Intermittent Operation

A word on the nasty habits of some thyristors. We've had several cases of sets with thyristor line output stages

shutting down intermittently, accompanied where relevant by the demise of a start-up resistor. It's happened to us several times with the Ferguson 3787 and the Grundig GCS100, and on odd occasions with other similar chassis. In each case the cause of the trouble has been traced to an intermittently open-circuit gate-cathode junction in the flyback thyristor – each time the type involved was encapsulated in a TO220 plastic pack. The fault is easily diagnosed (once you've gathered your wits) by means of an oscilloscope check, which will show the presence of trigger pulses at the gate of the device but no activity whatsoever at its anode, which sits quietly at 300V.

### Gate-controlled Switches

At the risk of being accused of wandering off the point a little, we hesitantly bring up the subject of the gate-controlled switch device used in various (mostly 18in.) Sony colour sets a few years ago. These bore several numbers – SG608, SG613, and the current replacement type SG6533. We don't propose to embark on a description of their tendency to go dead short and almost write off the KV1810UB sets in which they were used, but rather to describe a nasty, if less catastrophic, habit that some specimens used in the line output position (Q901) in the KV1820UB develop.

We've on several occasions encountered a situation just like that described above for flyback thyristors – intermittent shut down due to an open-circuit gate-cathode junction. The tell-tale symptoms are the same – high-amplitude gate pulses are present but the device will not switch on. Beware of this – and of the high price of a replacement SG6533!

## My Brother's TV

Les Lawry-Johns

ONCE upon a time I was advised never to do jobs for friends or relatives. I now realise the infinite wisdom of that. Since yesterday as a matter of fact.

I'd sold my brother a new Philips G8 some years ago. The tube went soft after three years, and there were a couple of minor incidents some two years back, but apart from that it's done pretty well. Fortunately the tube problem occurred within the four year insurance period and it was replaced, but the replacement tube did leave something to be desired. We've soldiered on however, with the help of the reactivator and one or two bits and pieces.

### A Watery Picture

The other day I had a call to say that the picture was watery. Apparently it was rippled, which is a bit unusual for a G8. So I pondered a while about what to stuff into my little boxes. Tuner unit, plenty of capacitors, transistors etc. As soon as I saw the picture I kicked myself for not bringing a tripler. With the sound turned down I could hear a hissing noise, and removing the rear cover seemed to confirm that the tripler was a bit dicky. Probably because my brother smokes too much.

So I nipped back to the shop for a tripler. I say nipped, but in fact I got caught behind a couple of learner drivers. The first one was loath to drive out on to an empty main road, and appeared to be waiting for something to come along for him to be cautious about. The second one had similar qualms at a roundabout. Once I got back I rushed into the shop and promptly got involved in a repair that was required urgently. So it was some time later that I dashed out again, clutching a tripler.

Once again it took a little while to reach my brother's home, and as I pulled up I pondered upon the reason for my total lack of preparation. When did I ever go out to a G8 without a line output transformer for example? Suddenly my blood froze. I'd been back to the shop and hadn't picked up a line output transformer. What if...

### Shrimps for Tea

Why was I so mixed up in dealing with my eldest brother? Was I still the same small boy with the same inferiority feelings? Perhaps it's because he has three Christian names while I have only one. He had been named after my father, my grandfather (the ferry boat captain, if you remember) and the lodger, Uncle Tom. On top of all this my mum always peeled his shrimps for him at tea time, while I had to peel my own – and very good at it I am too. So I suppose that's how I got myself into this mess.

The tripler was duly installed, and of course made little difference except that the hissing didn't sound so loud. I still had this fixed idea that the trouble was something to do with the e.h.t. feed, so I blamed the line output



transformer – who wouldn't with a G8? – and like a fool dashed back to the shop to get one. Hurtled back and fitted it in record time. The picture was as smooth as silk and I offered up a prayer of thanks. Back on with the rear cover and fit the aerial lead. Heard my brother making this nasty comment to his wife, so I popped my head over to look at the screen. Looked smooth enough to me.

"It's still not done" he said flatly. "It rippled like buggery while you were hiding away behind it."

So I looked at it for a long time, but it remained smooth. Then I had this urge to run. Never mind the tripler, never mind the transformer, I just wanted to get back to Honey Bunch to tell her what a horrible time I'd been having.

I prepared to leave, suggesting that they try it for a few days to ensure that it was indeed o.k. The expression on my brother's face told me that he didn't think he needed a two-day evaluation, and that in his opinion the fault had not been cleared, just papered over so that I could get away.

### Two Days Later

A couple of days later Joyce (his wife) phoned to say that the set was as bad as ever, and that Albert was ill and in bed. So I nipped over and collected the set before he got up. As it had a stand this had to be removed first, but before you could say knife I had it on the bench and was subjecting it to my cool, icy-calm reasoning.

It's not the tripler, so back goes the old yellowed one. Not the transformer either so back in with the old one. Switch on and there's a hell of a sparking, with the picture doing all sorts of things. I looked at the transformer and could see the overwinding lead arcing to the output nipple where it had broken away. Clean lead and solder it to the base of the nipple. All was now quiet and I couldn't see any ripple at all. Next try a vibration test. This meant that I gave it several sharp blows. The ripple returned for a second or two. Move the e.h.t. lead and it rippled again. I noted however that moving the lead also moved the leads and plug to the top (blue) convergence socket. Move the leads and it hissed at me. This was it then, a simple poor connection at the socket. In no time all was secure and the contacts firm.

All that was left was the fact that the blue gun was a little low on emission. They said they were going to get a new set within a few weeks, so I thought a slight reactivation would be all that was required to keep them happy. This proved to be a little more difficult than I first supposed, but it finally came up after I remembered to switch on the reactivator.

### Funny Colours

Back it went, and I stood it on its end to put on the stand. When I switched on the purity was terrible. I thought that the jolting in the car might have moved the purity rings, so I spent some time getting a pure red raster and then going through the whole convergence procedure. At last it looked good, so after asking about Albert's health I departed.

As soon as I got outside I realised that turning the set up on its end had moved the shadowmask, and that this would revert to its original position within a short time. Instead of adjusting everything to suit the shadowmask's new position, I should have given the cabinet a sharp tap to return it to normal. But I hadn't. I thought of phoning

Joyce to tell her that the colours would change and that I'd have to go back yet again, but I didn't want the phone to disturb Albert so I left it for a while and then forgot all about it.

The next day Joyce phoned again to say that the colours had gone funny, and that Albert was better and would be around when I called. He was. I could read his mind as I reset the purity and convergence. "Always knew he was hopeless. Should never have let him loose on the poor old set. How could my young brother be any good at anything?"

However, there it was. A perfect picture. Until the plug on the convergence unit started playing about . . .

I got through a bottle of scotch that night, saying "good old Stan" and "happy new year Stan" every time I poured a nip into my glass. H.B. said Stan should never have given me the bottle, because when I paid for it myself I never got through more than half a bottle. Next day I'd a dose of the runs, but I was sure it was a touch of the flu and of course I needed scotch to ward it off. She said cold water would be better for it, but I couldn't believe that.

### Highland TV

Had a very nice letter from Mr. A.J. Bullock the other day. He lives in a very remote part of the Western Highlands some fifty miles and a ferry from the nearest town. How he can cope with all he's expected to do, including the doctor's E.C.G. machine and building preamps to keep the local (extreme fringe) reception going, completely defeats me. Anyway congratulations A.J., and keep up the good work. Scotch is a great helpmate when the going gets rough. An article on your adventures would make interesting reading.



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# Doing our best

Les Lawry-Johns

WE haven't been at our best lately. As a matter of fact we often wonder if we'll ever be our cheerful, nothing too much trouble, delve a little deeper selves again.

Look at the trouble we had with Mrs. Groaner's set. We'd sold her this nice Philips 20in. set with the KT3 chassis some eighteen months previously – we've sold many others and haven't had the slightest trouble with any of them. But here was Mrs. Groaner on the phone, moaning her head off because she thought she'd be without it for a few hours and perhaps miss the evening programmes in colour (she had a monochrome portable, but said that wasn't the same). So we nipped up in the afternoon and had a quick look.

There was plenty of h.t. up to the BUW84 chopper transistor but no 129V regulated output. So either the BUW84 was out of order or it was not being switched on for some reason. A quick meter check proved that the BUW84 was capable of working, so there was a fault farther down the line. We whipped the set off its frame and assured Mrs. Groaner that it would be back before the evening's viewing got under way. That didn't suit her. She told me to be quick as she wanted to see Blue Peter. So I rushed.

Back on the bench we decided to start by making a few quick checks before switching on. We scored a bull's eye first time: the upper right line output transistor was short-circuit and a new BU205 was fitted in no time at all. We then switched on and there was a nasty flash and bang which frightened the life out of me. The dog ran for his life and Honey Bunch appeared.

"What are you doing to Mrs. Groaner's set? Blowing it to bits isn't going to get it back to her by five o'clock like you promised."

I scowled and kicked the dog, who'd come back to find out whether the fireworks were over.

I withdrew the rectifier panel and examined it closely. The 2A mains fuse was shattered and a check revealed that the 4.7Ω surge limiter resistor R6191 had blown open. "Something must have done that" I diagnosed accurately. But what? Checking the supply line showed no shorts at all, so I assumed there'd been some sort of flashover that wasn't going to reveal itself easily. A new fuse was fitted, and a new 4.7Ω wirewound. I called out to H.B. "you watch the back of the set and see where the flash occurs", averting my eyes so as not to be frightened again. I switched on and there was another nasty flash and bang.

"It came from here" she said, apparently unperturbed by the explosion. She was pointing to the base of the panel.

So I checked carefully between the panel pins and the socket, but found no signs of a flashover. There followed a good half hour of pure farce, during which time several more fuses and resistors were sacrificed. Finally I started to disconnect various items to make a more thorough check. I eventually discovered that there was a fairly high reverse resistance reading through the BUW84, enough to justify removing it completely. All was then revealed. The plastic envelope was blackened and partially decomposed. Here was the source of the flashover that had alarmed the

dog so much. It was a good job that one of us had kept cool and remained unruffled.

Mrs. Groaner got her set back before five o'clock, and advanced her own theories about the cause of the trouble. It had to be the aerial or the mains lead as the set itself was so new. We managed to escape without too much aggravation, and made our way back hoping that the next few jobs would be a little easier on our nerves. What a hope!

## A Rank T22A

There on the bench was a Rank T22A, with a note saying that it made a funny noise but didn't do anything else. So we accused the tripler and unhitched it from the line output transformer. Bull's eye! The set started up and the tube heaters glowed. So we fitted a new tripler and confidently switched on. The channel indicator said 7 instead of 1, and a BBC-2 programme appeared. It also appeared whichever selector was touched, and we wondered about that for a while.

We reasoned with ourselves. There'd been no mention of tuning troubles, so this must have happened during or after the tripler trouble. Immediately after, if after. So we made sure we had the tripler connected properly from an earth and diode point of view. The chassis connection is made via R13, so we measured the voltage across this resistor. As its value is 330Ω, the voltage across it should not have been too high. It was heavily negative, because R13 was open-circuit. The correct reading was obtained when a new resistor was fitted, but the tuner was still keen on BBC-2 and nothing else.

Over to the touch tuning circuit to make some voltage readings. The two chips (SAS580 and SAS590) receive a stabilised 33V supply at pin 16, but the reading we got was only 10V. Since it was the easiest thing to do, we removed the SAS590 from its holder. The 33V line returned to normal and we could now select channels 1-4 via the SAS580, though without the SAS590 channels 5-8 were unobtainable. We were winning however. We didn't have the required chip, but a frantic phone round produced one from Raymondo who was busy stocking up at the time. Whilst waiting for the chip we had a look at the circuit and noted that the 33V supply is obtained in a rather curious way, from -50V pulses which come from the line output transformer (see Fig. 1). This all seemed to prove that the faulty tripler had had something to do with it.

With the new SAS590 in, all channels could be obtained and we felt quite pleased with our efforts. For a while. A very short while.

## Mr. Croaky and the ITTs

I groaned when I saw who was bringing the next set in. We'd seen Mr. Croaky's ITT CVC9 before. Several times before. The last time had been only a week or so ago. It wasn't the set that worried me, it was Mr. Croaky himself.

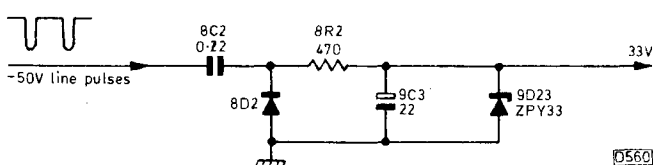


Fig. 1: Circuit used in the Rank T22 chassis to obtain a 33V supply for pin 16 of the touch tuning i.c.s. There's a separate 33V supply for the tuning potentiometers.

Whatever was wrong with the world, Mr. Croaky knew how to put it right. Whatever you did was wrong, and Mr. Croaky knew what you should have done. In short, the sooner you got rid of him the better your nerves would be.

He said that last time there'd been a large gap at the top and bottom of the screen. I'd checked the voltages in the field timebase and found them all in order, and after resoldering all the connections around the PCL805 the height had been restored and no amount of tapping around in this area would make the fault reappear.

Now here he was again, with the same fault. I again checked around the PCL805. Everything was in order. So I tried tapping around at the bottom of the right side line output panel, and found that the fault would come and go almost at will. Making the taps lighter and lighter brought us to the print side of the scan-correction transducer, and resoldering the connections to this produced a lasting cure.

"That's just what I thought it would turn out to be" said Mr. Croaky. "You and your wife should stop smoking you know." He's right but we still do it. We also do a fair bit of drinking, but we didn't tell him about that. How else can you forget about the Mr. Croakies of this world?

We also had a CVC20 that gave us a bad time. Intermittent colour. One tap, it's gone. Another tap and it's back. Whatever part of the decoder panel was touched would either promote the fault or clear it. We eventually gave up trying proper test procedures and resorted to resoldering every joint in the vicinity of the centre section of the panel. It worked and we've had no trouble since.

### **My Brother's TV**

You may recall that we mentioned a spot of bother with my brother's G8. The convergence panel continued to

give trouble and he now has a nice new K30 with a 22in. tube and full remote control. It was the only way I could get some peace. I can sleep whilst he plays with the buttons. Just to make sure, I put an alkaline PP3 in the remote control handset. That'll put off his next visit for an extra year or so. Brotherly love they call it.

### **A Final Moan**

A great deal of our working day seems to consist of acting as an unpaid technical adviser. Although my favourite phrase is "I don't know", this strategy seems to have flaws.

As an example, this chap comes in and wants to buy a switch. You ask him what for and he says he wants to run an extra pair of speakers or maybe he wants to fit a master switch to switch off locally his multibank mains supply for his audio separates. You show him a suitable switch, priced at say 50p. How do I fit it? So you draw a diagram for him and he raises all sorts of reasons why his system requires a different layout. You try to accommodate him with a revised drawing. By now about half an hour has elapsed, and you've forgotten the masterstroke you were about to make on the music centre you were half way through repairing.

I know what you'll say. You shouldn't be servicing in the sales area. I've tried the remote approach, secluded in a separate workshop, but the result was even worse. "Les, would you come and explain something to this gentleman. Oh, I forgot you weren't there . . ."

So we continue to sort out odd nuts and bolts to suit queer cartridges, draw pretty diagrams for people who won't follow them anyway, and then find at the end of the day that there's precious little on the till roll.

## **VCR Clinic**

**Reports from Steve Beeching, T.Eng. (C.E.I.),  
Derek Snelling and Michael J. Cousins, T.Eng. (C.E.I.)**

### **Ferguson 3V31**

We've noticed that not all 3V31s produce a good still picture without any tracking noise. Some batches are very good, others are not so good. If the tracking noise wanders up and down the screen with the VCR in the slow-motion mode, the drum guides need slight adjustment – the drum exit guide possibly about a quarter of a turn clockwise. If the tracking noise remains in the same position, adjustment of the still picture and slow-motion pulses should be carried out in accordance with the instructions in the manual – except that the noise pulse can be extended from 8msec to 11msec. Another check is to select still picture and see where the noise bar is. If it's at the bottom of the screen, rotate the pinch roller gently a few degrees anticlockwise. This should move the bar down the screen. If further noise is then seen at the top the trouble is due to excessive loss of f.m. carrier during the crossover between the heads. This means that the drum should be replaced as it's out of specification on head tip heights. **S.B.**

### **JVC HR7200**

An Irish tinker came along with this JVC HR7200 (3V29 to those of you who deal with Ferguson machines). "It won't work son" (me "son"?). "Can you fix it – it's worth a drink." Hmmm.

The head drum didn't rotate and the servo output amplifier chip was getting hotter and hotter. The drum trembled a bit if you pushed it, indicating that some power was being applied though not enough to rotate it – or that the power was being applied to rotate the motor in opposite directions at the same time. These machines use direct drive motors, which have two sections, each covering 180° of rotation. There are two sets of drive coils mounted at 90° and two Hall effect switches to control the switching of the drive coils via the motor drive amplifier.

The most common cause of such a fault is failure of the motor drive output stages, in this particular machine a power i.c. So the chip was changed. Wrong again! A scope was then attached to the motor and it was persuaded to rotate, albeit slowly. Both coil drive waveforms were present and in antiphase, though one was of low level. Outputs were also present from the Hall effect switches, but again one was low and distorted. Unfortunately the only course of action now open was to replace the drum motor, which is of course the lower drum assembly, and then go through the tape path alignment checks. All that for a drink, and these days I don't . . . **S.B.**

### **Colour drop out – Toshiba TVs**

This one is about TV sets rather than VCRs, though the problem shows up when the set is used with a VCR. The

up their energy to form electron-hole pairs as before. There's an important difference between the SDA tube and the SIT however: in the basic SDA tube one light photon falling on the target creates one electron-hole pair, whilst in the SIT one light photon falling on the photocathode liberates one electron which after acceleration has enough energy to generate up to 2,000 electron-hole pairs at the target. Hence the enormous increase in sensitivity.

### Gain of the SIT Tube

Since the energy given to the image electrons is determined by the accelerating voltage, the intensifier's gain can be altered by varying this voltage. A typical range is 4-9kV, the upper limit being determined by the risk of electrostatic breakdown around the faceplate and the lower limit by the amount of energy needed to overcome the inevitable energy loss at the target. Although the voltage required is high, the current requirement is very low and the photocathode voltage is normally generated by a flyback system driven from the camera's line timebase. This synchronises the power supply with the scanning, so that any interference arising from the supply will appear stationary on the picture. The smoothing of an asynchronous supply has to be much better as interference from it will drift through the picture, which is a much more objectionable condition.

The low voltage supply used to power the e.h.t. generator can be varied to control the output voltage. This is easy to do electronically, and by combining the gain control electronics with the iris position servo circuit the tube's sensitivity can be adjusted to cater automatically for a wide range of illumination levels. A double servo loop is used, set up so that the photocathode voltage is kept constant at about 6.5kV while the lens iris is away from either of its end stops. This keeps the tube's signal-to-noise ratio at its optimum condition. Once the lens iris loses control (i.e. fully open or closed) the intensifier voltage is

varied to increase the range over which the tube can be used. With a suitable lens, the tube can be used from mid-day to deep dusk without attention.

To anyone used to more conventional CCTV cameras, the sensitivity of the SIT camera comes as a surprise. Setting up the camera at the extreme end of its sensitivity range must be done in a darkened room, and sometimes the light from the monitor screen can overload it. Perhaps unexpectedly, the sharpness of the picture improves (within limits of course) as the light level drops. The reason for this is that at high light levels the e.h.t. is at minimum with the result that there is slight defocusing.

Because of their high sensitivity, SIT tubes are often used for surveillance applications. Another important application is for use in underwater cameras.

### Intensified Intensifier Tube

A further version of the SIT tube, the intensified intensifier target tube or ISIT, uses a two-stage intensifier to increase the sensitivity down to almost the ultimate limits determined by photon noise. The increased sensitivity is obtained at the cost of increased noise on the picture and increased camera complexity – two high voltage supplies and their control circuits are required instead of one. Needless to say the tubes are much more expensive.

### Alternatives

Despite its drawbacks the basic vidicon is still widely used since it's cheap. The CCD semiconductor type of image sensing device has been under development for many years now but remains expensive and has low sensitivity. An intensified version using an image intensifier of the type described above is also under development – the whole thing would be only a few inches in length. It will be interesting to see how long it takes for solid-state imaging devices to reach the performance standards attained by thermionic camera tubes.

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# Now and Then

*Les Lawry-Johns*

I WAS sitting at the typewriter wondering what I could say about that letter of mine in the February issue when this chap walked in. What about the letter? Well it was supposed to be a gentle leg pull of sorts. H.B. had had a brief chat with E.T. – the earthly one from the south coast who writes regularly in these pages. Advice had been obtained and in view of the E.T. mania recently – I'm talking about the other E.T. this time – we thought we'd sort of dress it up. It seems that some readers took it all seriously however, so apologies to anyone who may have been offended.

### The Chap

Now what about the chap who walked in? Well he apparently wanted a used stereo record player complete with speakers – and they had to be good speakers at that. I just happened to have exactly what he wanted, and as it had been around for quite a while I offered it to him for twenty pounds. He thought that was rather too much.

"Take it off your hands for ten" said he.

I don't bargain with anyone, so I showed him the door and off he went. After he'd gone I got to thinking about it. We really are on the losing end in this trade. Twenty years ago that type of unit would have fetched twenty pounds or more, second hand, with no bother at all. Since then wages have multiplied by ten times or so, but you can still buy a new stereo record player for something like fifty pounds, which makes a used unit seem (to some) dear at twenty.

### Economics

It's the same with repairs. Would the average person be prepared to pay ten times more than they did twenty years ago? Look at it another way. Thirty years ago if we fitted a new 12in. tube in a TV set it would cost the owner roughly twenty pounds. What was his weekly wage then? About ten pounds per week? Now we fit a 24in. monochrome tube in a set for roughly thirty pounds, and what is his weekly wage now? The reason of course is that new

electrical goods are so cheap that to repair them is just not economic, though we still do it. Thus we are poor compared to what we were twenty years ago, and we are likely to remain so. End of moan.

### **The Rank T20**

Mr. Grumpy's T20 was a nightmare. We'd fitted a new BU208A line output transistor, and as nothing else had showed up during checks and a soak test Mr. Grumpy had taken it home. We saw his car pull up outside and had an attack of the heart sinks. "It lasted only four hours" said Mr. Grumpy.

So we attacked it again. As the BU208A was once more short-circuit we again checked everything but could find no cause. Sure enough everything worked fine when another BU208A was fitted. We kept it on soak test for eight hours this time and it worked faultlessly. So Mr. Grumpy took it off again. And brought it back again.

This time we changed both EW modulator diodes, also the 0.91 $\mu$ F scan coil coupling capacitor, and fitted a new line output transformer. Another BU208A was installed and the set given a two-day soak test. Mr. Grumpy complained about the cost of the transformer and asked whether it was really necessary? So we suggested that he try it for a few days and if it went again we'd refit the old one. It did, and we did. There was no difference though, and this time the BU208A wasn't short-circuit.

The timebase wouldn't start until we shunted the line oscillator's start-up capacitor 4C19 with a 5k $\Omega$  resistor. Then it started working, and continued when the 5k $\Omega$  resistor was removed. The set was left looking into a mirror so that we could keep an eye on it.

After an hour or so we noticed that it was losing width, and before we could do anything it had gone off – leaving some 200V on the BU208A's collector to show that it wasn't short-circuit. We had to start it up again with the 5k $\Omega$  resistor, so as the 910 $\Omega$  resistor 4R16 in the 12V regulator circuit is notorious for messing about we changed it. The one taken out read perfectly all right, and we still had to start the set by hand as it were. This time it lost width and line hold after a couple of hours, so we changed the TBA950 line oscillator chip. It then worked fine for a long time before line hold was again lost and the set cut out. I cried but Honey Bunch summed it up in flash.

### **The Dry-joint**

"Dry-joint" said she.

"All right, but where?"

"How should I know? I didn't ask you to sort out the knitting pattern last night, did I?"

So I stared at the right side line output panel, having stared at the timebase panel for some time. And suddenly I saw it. On the line driver transformer. It was just a thin line round one of the base leadouts. Like a flash it was resoldered, together with every other connection in sight. The set came on straight away, and has remained all right since. I still have bad dreams about Mr. Grumpy coming back, but he hasn't.

### **The Music Centre**

Mrs. Earlybird brought in her music centre complete with one loudspeaker. It was a Ferguson Studio 20. Apparently her husband had repaired (?) the loudspeaker,

and after trying it in both output sockets both amplifiers had packed up. I opened up the speaker and found that both leads were plugged on to the same speaker tag. It was thus a complete short-circuit, and after he'd plugged it into one output and killed that amplifier he'd done the same with the other one.

We removed the bottom screws and lifted the top off (record deck and cassette). All four 1 $\Omega$  resistors in the output stages looked distressed. So we changed them and the four transistors for good measure and tested the unit before putting the top back on. It worked perfectly on both channels. So we put the cardboard cover back on top of the output transistors and refitted the top unit. It still worked so we put the bottom screws back in and made a final check. One side worked, one side didn't. Smoke came out.

Out came the bottom screws and off came the top cover. The two 1 $\Omega$  resistors on one side had burnt out. No, only one of them. Funny. I checked the current drawn and it was normal. Fitted another resistor and it kept its cool. Refit the cardboard card and replace the top – after a tussle with the radio panel. Everything was o.k. so I refitted the bottom screws and tried again. One side o.k., smoke. By this time it was getting late and I called it a day.

### **The Dream**

During the night I dreamt that I was a brave knight and fought everybody in a place called Camelot. I was called to the King's chambers and he was fixing a music centre. He unscrewed the transit screws to bed the deck down. Then he looked at me and bowed. "Look you" he said, "when you do this you bed down the record deck and the metal speed selector touches the top of the output transistor heatsinks or one of them and shorts it to earth, doesn't it?"

"Yes sire. It does to be sure, but there's a cardboard cover to stop it touching and I keep putting the cover back. I do really."

"Listen. Listen while I talk to you. There's a right way and a wrong way of doing everything. Now go."

So I went, and woke up. I stirred restlessly until I woke H.B.

"There's a right way and a wrong way of doing everything" I told her.

"Have you just found that out?" she growled sleepily.

"The King just told me, look you."

"Look you moron, there may be two ways but as sure as fate you'll always choose the wrong way first. Now go to sleep."

### **In the Morning**

And so it was that the first job in the morning was to reverse the cardboard cover to prevent the speed selector touching the heatsink when the screws were tightened – after replacing the 1 $\Omega$  resistor again of course.

If the transit screws had been left to let the deck float it wouldn't have happened.

I then took Ben for his morning walk. The Hillman Hunter still has a list to starboard, but now there's a bloody great CB aerial stuck in the centre of the boot. Not looking where I was going I felt unfamiliar ground under my feet. The council have filled in the pot-hole and tarmacked it over. Thank you council. And thank you readers for hoping I wasn't going to get my feet wet yet again.

# *The Further Adventures of Tiny Tim*

*Les Lawry-Johns*

Tiny Tim woke up early in the morning and started to think his usual gloomy thoughts. What was wrong with the world was that there were too many people in it, most of them wanting him to do things that he didn't want to do for them. He killed off a million people mentally. Still too many. So he killed off another million and too many remained. Wouldn't it be nice if there were no people at all?

The animals would be able to go about doing whatever it is that animals do, and the forests would grow nice and big. There would be great big forest fires with no one to put them out. All the animals would be burnt. Oh dear, that wouldn't do. His cat Spock would catch cat flue and die because she wouldn't have had her jab from the vet. Oh dear. Perhaps firemen and vets could live then? Except the vet who was going to bring in his car radio-cassette. This frightened Tim because it was a Philips machine and he had a job to get the cassette drive belt back on when it bounced off as it had a habit of doing. So one vet would have to go and another would have to be found to give Spock her jab to ward off cat flue.

## *Pinnacle of Despair*

As he lay there he thought of the nasty letter he'd had from one of the wholesalers. If he didn't pay their account they would do nasty things to him. He always paid his accounts on time, but he wasn't going to pay this one because it was daft. He'd ordered six video cassettes for his wife to play with and they'd sent sixty one. As eight were loose he'd decided to keep these and send the rest (53) back. He'd phoned the firm and the girls who'd answered the phone had laughed and said the rep who'd taken the order must have had a shaky hand. So they'd laughed some more. He'd put the phone down but nothing was done about it. The cassettes were collected by a well known firm of carriers who signed the collection note.

Tiny Tim had again phoned the wholesalers to let them know that the cassettes were on their way back to them, but the man at the other end said he didn't know what it was all about. Tim was eventually promised a credit note, but it never came despite several more phone calls. One person had said that they hadn't got back the number specified. This had made Tim angry, and he'd said nasty things that his wife had said he should have been ashamed of saying. So the statement had come in, along with a nasty letter which Tim had returned with a comment to the effect that the liaison between their departments was deplorable. This was much nicer than what he'd said on the phone. So he dug in his tiny heels and waited for the nasty things to happen.

## *Daylight*

As it was beginning to get light, Tim decided it was time that someone should get up and make the breakfast. So he stirred around enough to wake up his wife and then snored to pretend he was asleep. His wife looked at the clock and heaved a sigh.

"He lays awake all night thinking stupid things and when it's time to get up he goes to sleep. God how I suffer."

Tim snored loudly to ensure that his wife wouldn't go back to sleep, and eventually she got up. Tim smiled at the picture of the tiger on the wall. "We each of us have our own ways of getting our food" he told the tiger.

His wife brought up his breakfast, and Tim noticed that she couldn't burn the scrambled eggs like he did to give them a nutty flavour, but he thought it best not to complain. Something about not tampering with your luck.

He ate his breakfast and drank his tea, then laid back and sort of slipped off to sleep. He was rudely awakened by his wife talking to customers in the shop.

"I'm sorry but he's out with the dog at the moment."

Which was a bit shaky since Ben had been standing with the lead in his mouth for the last half hour or so.

Tim waited for the customers to leave, then crept down the stairs.

"Mr. Crankcase wants a new colour set delivered by ten o'clock. He wants a 22in. without remote control or any trimmings. No later because he's off to America and wants to see it and settle before he goes. So you'd better put your skates on."

"I'll just take the dog for his walk, then I'll get cracking" said Tim.

"Oh excellent" said his wife. "Mr. Crankcase lives at Birling, which is a long way away. You haven't unpacked the set yet and it's now nine fifteen."

"Oh dear" said Tim. "Why didn't I get up earlier? Why did you let me nod off again? I must fly." So he flew, but went in the wrong direction because he'd forgotten where Birling was. He ended up feeling very confused, driving along the M20 towards Maidstone. It all ended happily however, because Mr. Crankcase had delayed his departure.

But Ben was rather peeved. He stopped at a post but missed it, contriving to hit Tim's leg instead. This reminded Tim of the time he'd been standing at the top of Windmill Hill looking out over the river and a big black dog had come and stood beside him. Tim had patted the dog's head, thinking how good he was with dogs, but had suddenly become aware that his leg was soaking wet. It was a very large dog.

Tiny Tim made his way back to the shop, talking to Ben and telling him that in addition to getting rid of all the people in the world the dogs would have to go as well, leaving just a few bitches – they don't cock their legs at every tree, post and leg that happens to be near.

## *Trying TVs*

When they got back, quite a few jobs were waiting to be done. The first was a GEC set fitted with the 20AX tube (Model C2233H). A note on it said "no results". The right side fuse (on the switch-mode power supply panel) had blown, so Tim looked askance at the BU126 chopper transistor. It was short-circuit. As he fitted a new one Tim was thinking. He'd had this trouble a year or so ago and the new one had died very quickly indeed. Then there was

a note on the same subject in a recent Fault Report item in *Television*. The driver transistor is biased by a nasty 150kΩ resistor. Now where was it? Ah, just there, R515. Take it out and measure it. Reading about 4MΩ.

Tim didn't have a 1W, 150kΩ resistor, so he was a devil and used a 220kΩ one instead. It worked well enough, so he logged this information in that magnificent computer he has atop his shoulders – another one not to be forgotten.

The next set was an ITT CVC9 that belonged to one of Tim's old school chums (which makes him very old). It had been in several times of late, suffering from loss of colour which seemed to be restored permanently each time Tim did almost anything around the decoder, only to fail again several days later.

Tim had first found that when the base of the 4.43MHz reference oscillator transistor T38 was touched with the test prod the colour returned and couldn't be made to go off again. So he'd changed T38. On the next occasion it had seemed that the crystal was faulty, so Tim had fitted a new one. He'd thought that this was unusual in an ITT set, but concluded that as he was very rarely right about anything it must be the case since the colour stayed and stayed. Here it was again however.

He put the probe on the base of T38 and the colour appeared. He looked at the board and the blue 470pF capacitor (C228) in the oscillator circuit (base-emitter feedback) caught his colour prejudiced eye. He doesn't like blue things. So he changed it and the set has been all right ever since.

### **The Music Centre**

A Fidelity 440 music centre sat there waiting its turn. Its owner, a nice man by the name of Les Woolends, came in just as Tim was about to perform.

"Thought I'd pop in to tell you what's wrong with it. It won't record on one channel."

Tiny Tim scowled at him. "It's a pity you didn't take it back where you bought it."

"I bought it here."

"Just testing, just testing." Tiny Tim was aware of his wife's eyes boring into his back.

Without further ado Tim removed the bottom of the music centre and squirted a jet of Servisol into the record/playback switchbank. Much to his surprise, it now worked on both channels.

Putting on his 'leave it to the master' air, Tim replaced the bottom cover and chatted away to Mr. Woolends about cats and things.

### **Night-time**

That night Tiny Tim had a nasty dream about being eaten by a great big cat. He awoke bathed in perspiration and decided to have a nice wash to freshen himself up a bit. So down to the bathroom he went, and gave himself a good wash down. He dried off and looked for his talcum powder. It was some distance away, at the far end of the bath, so he decided to use some of his wife's instead. But no matter how hard he shook the pink tube nothing would come out. So he tried the green one which had two nice big holes at the top. He shook the powder all over his private places and rubbed it in, noting that it seemed rather coarse for his little body. He tumbled back into bed, thereby waking up his wife.

"Now what are you up to?"

"Just been to the bathroom for a wash. What's the talc in the green tub?"

"That's not talc, you fool. It's shake 'n vac carpet cleaner."

"Oh dear" said Tiny Tim.

## **VCR Clinic**

**Mike Phelan, Richard Roscoe and  
Michael J. Cousins, T.Eng. (C.E.I.)**

### **Ferguson 3V23**

The fault with a Ferguson 3V23 was noticeable only on a stationary picture. It looked as though there was a slight ripple on the verticals – but only on about the centre third of the picture, the top and bottom being o.k. As the fault was also present on still frame we had a look around the drum motor drive circuit. This is a brushless, direct drive motor, so the pole switching is done by Hall sensors and a magnetic ring (instead of a commutator and brushes).

The sensors drive many transistors, culminating in two power stages which supply current to the two sets of poles. When the head is running we should have an equal sinewave on each pole, but in this case one was missing. As a result, the drive was varying. One very discoloured power transistor gave itself away, but while we were measuring voltages we noticed that the supply to the motor was about 22V instead of 12V – the regulator transistor in the power supply had gone short-circuit. It's surprising that anything worked at all! **M.P.**

### **Ferguson 3V00**

"We've fitted a new head, but can't get the tape guide rollers adjusted" they said. We connected the scope to

TP7 to monitor the video f.m. envelope, and found that while we could get rid of the dip at either end of one channel it was then transferred to the other channel. Now in theory each head follows the same path, so the condition we had shouldn't be – unless the heads were not following the same path, due possibly to the spindle being bent. We removed the head and there it was – a piece of something indescribable, compressed to a few thou and stuck to the mounting flange with the result that the drum tilted fractionally. **M.P.**

### **Ferguson 3V00**

The fault with a Ferguson 3V00 was severe herringbone patterning on the chroma on its own recordings only – prerecorded tapes played back o.k. The chroma record current control R2 on the pre-rec board was set too high. **M.P.**

### **Ferguson 3V29**

There was no capstan servo action with this Ferguson 3V29, and a check showed that there were no off-tape control pulses at TP2 (adjacent to IC2) even with a



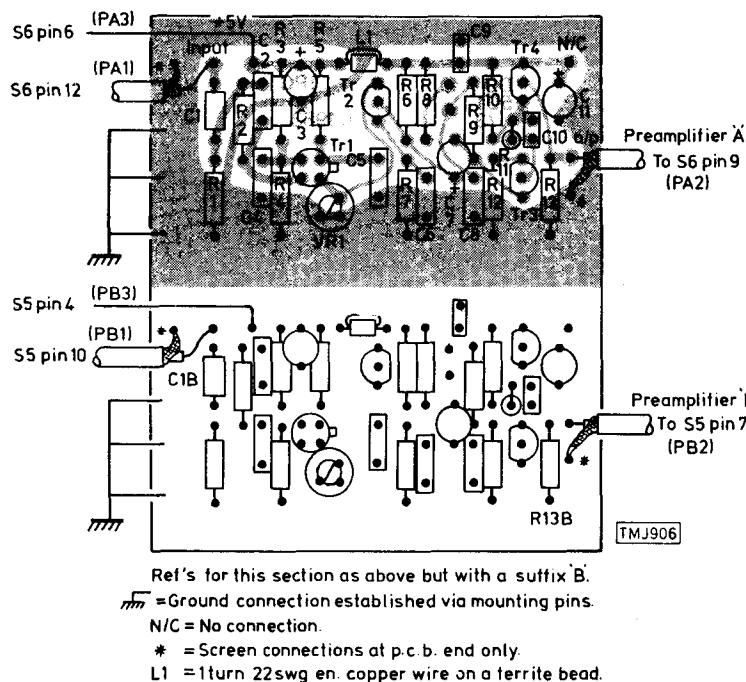


Fig. 12: Preamplifier component layout.

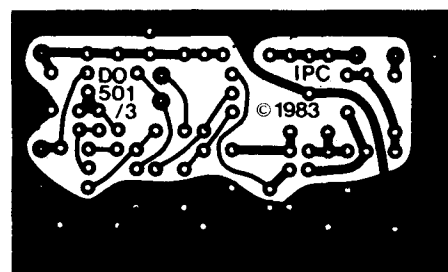


Fig. 13: Preamplifier board pattern.

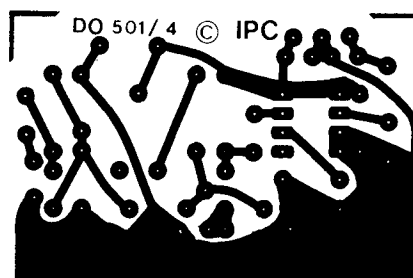


Fig. 14: Prescaler 1 board pattern.

bought fully built and tested for £190.49. Both prices are inclusive of postage, packing and VAT. The main board DO501/1 is available from Readers' PCB Service at £15

while the other boards are available at £1 each. In both cases the address is Fleet House, Welbeck Street, Whitwell, Worksop, Notts.

# Lords of the Morning Air

Les Lawry-Johns

MANY years ago, more than I care to admit, I was an avid reader of science fiction magazines. My favourite, if I remember correctly, was *Astounding Stories*. There were some good yarns in it, and the title of one sticks in my mind – it was *Lords of the Morning Air* and was about some superior beings that came to visit earth. They looked like us but were far superior of course, with long fair hair and blue and gold robes to prove the point. Kind they were too, not like us louts.

Anyway it was a bright and sunny morning, and as I took Ben for his stroll we first waved at the drivers of the cars – the ones that came up the road and honked at us – and then went round the back of the flats (two large blocks opposite the shop), continuing to wave at all the occupants who waved at us. One old boy opened his window and bawled out that he'd "let us look at his TV set later". "Thank you, thank you very much" I bawled back, without much conviction in my voice. What he really meant was that I was to be allowed to cart a load of equipment over to the flats, lugging it through the corridors, then performing a miracle on his old set before carting the lot back again. Anyway, we dismissed this diversion from our minds and continued our walk in the morning air, still waving to all and sundry and wishing we didn't have too because our arms were aching. Now we know how royalty feels. Royalty, that's what we were, *Lords of the Morning* . . . until we got back to the shop, when we became surfs once more.

Who should be waiting for us but Mr. Piddlewell – he who'd threatened to cut off our milk supply last time. He didn't even give me time to get the lead off my neck.

"We were watching that science fiction film last night when the picture went off and someone started talking in a foreign language – lots of other voices chattered away too."

"What do you expect if you put the volume full up?" I snarled.

"Well it shouldn't chatter away in a foreign language, should it?"

"It might if it doesn't feel well. It was probably delirious" I replied, looking on the shelf for an MC1330 chip.

"What's that?" demanded Mr. Piddlewell. "It doesn't look much."

"That there does a very difficult job" I explained. "When it stops doing it the set jabbars away in lots of foreign languages and you don't get a picture either."

"Oh" said Mr. P. "How do you know it's that?"

"Because I can feel it in my water" I explained, not wishing to go into detail about previous tests with prods at the input and prods at the output.

So we opened the signals panel of Mr. P's Thorn 8000 chassis, took out the MC1330 from the left-hand side, and fitted the new one. Just for fun I applied the meter's test prod to the chip's output pin and switched the set on. There was an air-splitting garble of voices from the speaker, and Mr. P's eyes widened.

"It's still doing it" he bawled.

"No it ain't" I said, removing the test prod and plugging an aerial in. Soft music accompanied the BBC-2 test pattern.

"You're having a go at me. I know you are."

"Not at all, Mr. P. I was just demonstrating that when the chip goes open-circuit it acts like an aerial for the reception of 6MHz signals and the harmonics thereof" I said, laying it on a bit thick.

"Oh, very genital" said Mr. P, reverting to his coarse upbringing.

"Well pay up, look big and sod off" I advised him, reverting likewise.

### **Another Lord**

Stripe me pink if Mr. Lord didn't walk in carrying a large Philips radio cassette. It was Mr. Lord my accountant.

"What do you want? you robber" I greeted him warmly.

He looked pained. "We don't rob you Les. It's not our fault if you don't charge enough for your services. At least we're realistic."

"I'll start charging realistic fees right now Mr. Lord" I said.

"Don't be impetuous. Rome wasn't built in a day."

"It would never have been built at all if the contractors had charged your fees" I replied, warming to my task.

Mr. Lord crossed his fingers and said "Faye Knights". That put an end to it of course.

"Sorry Mr. Lord. Well now, perhaps I can help you in some way?"

"It's just the cassette section of this thing Les. The pinch wheel is flopping about."

So he left it for me to fiddle with whilst he returned to his office to do his fiddling. I hope he had better luck than I did.

Due to my lack of observation I mucked about with it for ages. Having stripped it down and removed the cassette section I couldn't find any sign of the pinch wheel spring. So I thought I'd try to make one, which I did, having to remove the wheel to fit it. When I refitted the wheel and anchored the free end of the spring the wheel did what it was supposed to do and fitted tightly against the capstan. A little too tightly I thought, but blundered on.

To test the machine the panels had to be reassembled, so I thought I might just as well put the whole thing together anyway, just leaving the rear cover off. I switched on and pressed play. The capstan rotated nicely but the spool carrier didn't move. I tried again but it stayed still and refused to rotate. So I took the panels out again and got the screws thoroughly mixed up whereas I'd previously had them organised for proper replacement.

I stared at the cassette section and pushed down the play button. The plastic carrier went down but when I rotated the flywheel the take-up spool carrier didn't rotate. It would spin freely, but didn't engage with the sprocket which should have driven it. The sprocket is pushed into position by the plastic carrier which didn't seem to be travelling far enough. Perhaps it was because I'd anchored the spring to the carrier? So I took the pinch wheel off and tried again. The sprocket engaged, and the take-up spool carrier rotated with the flywheel.

At this point the cat walked across the bench and sat looking at the rear cover. Something was attracting her attention. It also attracted mine because it was a nice bronze spring caught up in the leads which connect the rear cover to the main unit. "Thank you Spock" I said gratefully as I shoved her off the bench.

So I put the right spring on and checked it carefully.

The pinch wheel fitted tightly against the capstan and the take-up carrier didn't rotate. I felt peeved about this, and once again removed the pinch wheel. The carrier then rotated. I stared at the assembly and then saw what I should have seen earlier. There's a plastic obtrusion just above the pinch wheel assembly, and I'd put the assembly back to ride below it, which was why it fitted too tightly against the capstan. Assembled so that it rode above the obtrusion, the plastic carrier could ride fully down and the sprocket would engage.

What would have taken any sensible person a few minutes had taken me over an hour, and I was not pleased with myself. No wonder I can't pluck up enough courage to tackle these videos. Just imagine what a mess I'd make. Mind you, some of these audio stack systems seem to be just as inaccessible, with the whole works up front and acres of nothing in the rest of the cabinet. Come back music centres, all is forgiven.

It wasn't my fault that my accountants had advised me to increase my service charges. Sorry Mr. Lord.

### **More Royalty**

What a funny thing. If you get one type of set in you can bet that a whole row of them will follow. In this case it was names however. Next along comes Mr. Knight who wanted his G8 repaired. He also announced that he intended to buy a new set for the lounge, keeping the G8 for the bedroom.

I didn't go along with this idea, and suggested that it would be more convenient to leave the G8 where it was and invest in a 14in. colour portable for the bedroom, with remote control so that if anyone was confined to bed they could change channels, control the volume and switch the set off with the small handset. In addition there would be a considerable saving because a portable was a lot cheaper than a 22in. set. As his wife was with him I added that a portable could easily be moved to the kitchen for the reception of breakfast TV, the set having its own aerial.

Mrs. Knight was immediately convinced and informed her husband that he'd be a fool to buy another large set.

So I showed them a Fidelity CTV14S, and they were most impressed with my demonstration of mirror reflected channel changing, though I couldn't quite see the value of this if you're watching the set anyway and holding the remote unit.

Mr. Knight announced his decision. If I could repair the G8, he'd take the portable. So we checked the G8 and found that there was lack of red. The red BF337 output transistor was o.k., but there was precious little turn on bias at its base. The driver load resistor R7326 (39kΩ) was accused of being high and proved to be so. I looked in vain for a 39kΩ resistor but the nearest I could find was 47kΩ, 2W. Fitting this restored normal operation without any need for adjustment, so we wrapped up the G8 and piled it and the Fidelity portable into the Knight's car, while Mr. Knight wrote out the cheque which was for a lot less than he'd expected when he first arrived.

What an honest chap I am. We haven't been able to get any 22in. remotes for some time . . .

### **Note on the G11**

Finally a note on the h.t. reservoir capacitor (C4029) in the Philips G11 chassis – it came up in the letters column recently. Green ones are just as bad as the red ones – blue or black are o.k.

# Laura's Dead Decca

Les Lawry-Johns

I'm sure you all remember Laura Lovitt, last reported as tampering with Titch the telephone man and giving me the old heave ho when she thought she was going to be busy one afternoon, and me going back to the shop to find another telephone chappie bugging about in the bedroom. Well, every dog has his day, he who laughs last, and all that.

The phone rang and it was Laura to say that her legs had at last given way and the Decca was now a damaged Decca. Could I call this afternoon?

"Are you sure your telephone's not tapped?" I asked.

Laura gave a gurgle. "He was only showing me how to fill in a football coupon. Very patient he was too."

"All right then. I'll be down this afternoon."

## How to Oblige

And down I went to give the legs a close inspection before examining the Decca. The frame's woodwork had given way as though the legs had been asked to support an extra offset weight (perhaps the set had been shoved from the side?). I could see from the front of the Decca that the tube had lost its vacuum, and this was confirmed by the sight of the bowler hat on the rear cover. It was cracked and bowed in, the tube base was in pieces, and the tube's neck was beyond recall. I shook my head sadly. "Sorry Laura. It's right bugged."

"I know it's bugged" said Laura with no trace of sadness, "but it's also insured and I've been wanting a new set for a long time. Now I'm going to get it."

We discussed just what she wanted for some time, and as the bedroom was only a sliding door away I suggested that perhaps a smaller set with remote control would fill the bill, so that she could watch the late night programmes in bed, change channels and switch the thing off without getting up, then wheel it back into the lounge in the morning. This idea seemed to appeal to her, so I nipped back to the shop for a 20in. remote control model and had it installed and working in no time.

She said the picture was good and she liked the remote control but the front presented a sort of blank, black appearance. Would she like to come back to the shop to see some others then? No. They don't look the same in the shop. So she wouldn't really be able to tell.

To cut a long story short, I had to do quite a bit of running around before she finally liked the Pye 3262 with full remote control, and of course she had to be sure that everything worked as she lay on the bed (it's not easy trying to satisfy some people...). She said she'd let me have the cheque when the insurance had been settled. I'm still waiting.

## Les the Bodger

I was asked to do a very quick job the other day. We'd had to write off Mr. Toolong's old 26in. Thorn 3500 as a dead loss. Until he bought a new set he was having to rely on his Philips 16in. portable (KT3 chassis, with remote control). This was in urgent demand by the family there-

fore, but had "gone funny".

The "funny" bit was that the colour was at maximum and couldn't be turned down. The controls consist of plus and minus buttons, but the colour couldn't be turned down no matter how many times the minus button was pressed. I rather suspected i.c. failure, and the first suspect (to me) was the SAF1032P remote control decoder i.c. (IC807), but there wasn't one in stock. The relevant bit of circuitry is shown in Fig. 1. Voltage checks confirmed that the control voltage at the emitter of transistor TS840 was over 4V and remained at this level instead of varying between 2V and 4V. This meant that TS840 was being turned on excessively because its base voltage was high. The voltage at the collector of TS836 was in turn high because there was lack of turn-on bias at its base. This suggested that either IC807 or R832 was faulty. R832 was in order - as were both transistors - so our suspicion of IC807 deepened. Frantic phone calls were made. "Sorry Les." "Sorry Uncle Les." "I'll have to send for one Mr. Toolong."

"But we want it today. Now!"

I looked at the preset R838. It didn't vary the voltage at all, but could be made to do so by wiring a little resistor across C839. Try 22k $\Omega$ . Not really. Try 15k $\Omega$ . Nice variation as the preset was turned.

"Well now Mr. Toolong, this control here is the ideal colour preset, and once I set it to your liking that's it."

He was quite pleased with this bodge up, and carried the set away smiling.

I was relieved too. It didn't have to be that particular i.c., because it gets its input from IC761, and there are various other complications.

## Minimatic, Big Wallop!

Here's a warning - be careful of those small Yugoslavian Minimatics. I was trying to sort out the print side position of a transistor and reached over to locate just where it was with my right hand. I must have jumped a couple of feet in the air (well, say two metres) or more. Whilst the e.h.t. stick is fully shrouded, the e.h.t. connection isn't - it's just a solder blob exposed to all and sundry, including me. You may say that it serves me right for not looking where I put my hands. Quite so. But I wouldn't like you to get the same.

## Fun with Fidelity

We've sold quite a few of these Fidelity CTV14R (and S) sets during the past year or so. Some have required attention recently.

The weak link appears to be the line output transformer, though this is not immediately obvious. The symptoms are that the h.t. builds up after switching on and then collapses with a tick, the process repeating. This

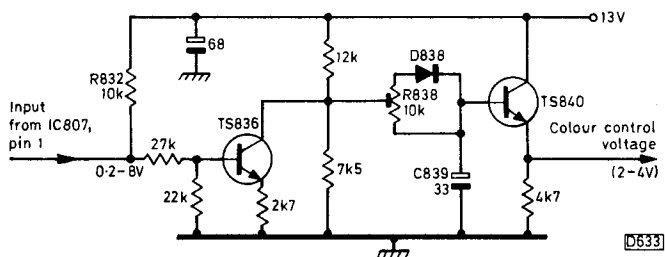


Fig. 1: Preset colour control circuit, Philips KT3 chassis (remote control version).

could of course be due to various overload possibilities or to the TDA2581 chopper control i.c. playing about. When the set is switched off, you may find that e.h.t. is present under the e.h.t. connector cap. This tends to suggest that the line output transformer is working correctly. When a replacement is fitted however the set works normally (for us, so far).

Removal of the transformer in the earlier model is quite easy – unsolder the tags, turn the tag round for exit, and remove the two screws at the top frame. In later models there's an extra strut on the frame. This covers the tag and means that the panel screws have to be removed to allow the panel to be raised from the frame.

Another frequent fault is failure of the chopper transistor TR13 (type BUX84 or BUV46). The transistor tends to go short-circuit, as a result of which the h.t. rises and the set shuts down.

The front control panel is also a bit flimsy and can develop cracked print, dry-joints and the like.

Intermittent operation, with all the channel LEDs coming on for a brief second, is often due to a dry-joint on one of the two long wirewounds at the rear left side. A moment spent resoldering these connections can be very rewarding.

### Bette's G8

Bette Hind is a lady with a lot of gusto. It's like a hurricane hitting the place when she comes in. "Hallo Les Luv. Will you get my set out of the car for me only I'm on double yellow lines and can't get away with it now they're all women."

"I can" I smirked. "You've only to rub them all over with soft soap."

Anyway, I got Bette's 20in. Philips G8 out of the car and on to the bench, and caught sight of the worried look on her normally alive with laughter face.

"I think it's had it this time Les. The picture went and there was a hell of a stink, then the lot went off, puff, just like that."

"Don't worry Bette. In five minutes it'll be as good as new."

So I took off the rear cover (a screw in each corner instead of the usual G8 struggle fit). Over on the right side I could see the transistor looking sick, so I removed plug H (the red one) to stop that nonsense and plugged the set in. Nothing. There was voltage at the bottom end of the top section of the "dropper", but nothing at the top. I switched off and decided to short the dropper tag to earth to get rid of the charge on the reservoir capacitor. Bang it went, because I'd not bothered to use a resistor, risking the screwdriver blade instead.

Bette jumped two metres in the air, just as I'd done earlier. "I told you the bloody thing was finished" she bawled. "It'll kill us all. Mrs. Seer said she saw it in the cards the night before last."

"Shut up for Gawd's sake" I snapped. "The thing's nearly done now."

"Done in more like it" she moaned.

I put in the new dropper and checked the fuses. The lower one on the left side (800mA) had blown. With this replaced the set was switched on and a good picture appeared. Being a 20in. model, the absence of raster correction (plug H out) was not noticeable.

"That's bloody marvellous" exclaimed Bette. "What about the smell?"

"It's Ben" I explained. "He's been a bit loose lately."

# next month in

# TELEVISION

## ● THE BETAMAX SYSTEM

Most published material and courses on VCRs are based on the Philips N1500/N1700 or the JVC VHS system, simply because the former was the first to appear on the market while the latter has been the market leader throughout. This means that the Sony Betamax system is probably less well understood than the other systems, though some Beta machines have sold in large quantities. Next month Eugene Trundle sets out to redress the balance with a new series on Beta video. The emphasis will be on areas where there are fundamental differences between the Beta VCR system and its better understood rivals.

## ● SERVICING THE PHILIPS TX CHASSIS

Pye and Philips monochrome portables fitted with the TX chassis have been good sellers for several years. John Coombes provides a quick fault-finding guide.

## ● VINTAGE TV – THE PILOT VS9

Pilot Radio was a well known name just before and after World War 2, mainly because of the firm's innovative radio sets. When the first Pilot TV set, the VS9, came along it too had unusual aspects. Chas E. Miller delves into another interesting bit of TV history.

## ● A MATTER OF SAFETY

Those who deal with dozens of TV sets often tend to become blasé about safety matters. Nevertheless a TV set, especially a defective one, can be a very dangerous object. Tony Thomson deals with the various aspects of the subject, both in the workshop and in the field.

## ● CTV BATTERY OPERATION

George Wilding takes a look at various approaches to supplying colour portables from a 12V or 24V battery. The TA126 converter used with later versions of the Thorn TX9 chassis is considered in detail.

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# Dotty Daydreams

Les Lawry-Johns

Before I tell you about Dotty, I must first tell you about the visit we had from a well known contributor to *Television*. During a quiet moment one morning the door opened and in walked this tall, handsome fellow, a sort of cross between Howard Keel and Humphrey Bogart.

"Is this Tiny Tim's shop?" he asked.

"Yes sir" I replied, thinking it was the inspector of taxes.

"Keith Cummins, glad to meet you" he announced.

"Well bugger me sideways" I stammered. "What a nice surprise. Come and meet Keith, Honey Bunch."

So we exchanged pleasantries before getting down to the serious business of running down the editor. After a while we agreed that maybe he wasn't quite such a bad bloke really, and after all someone had to think of the readers sometime or another.

During the conversation an assortment of characters wandered in and out, giving us their views on life and death, talking as though their affairs were of great importance and not realising how important were the people to whom they were addressing their trivialities. One was the author Alex Granger, who had just written a book about himself and signed a copy for us. Another was Johnny Moon who is, er, Johnny Moon.

The morning passed pleasantly enough, and in due course Keith had to go, collect his wife, and wend his way back to Southampton. Cheers Keith! Nice to have met you.

## Brown Eyes

My dream girl true has eyes of blue,  
but I think I could go for brown.

A picture of love, was this turtle dove,  
from her head to her feet right down.

H.B. had been to visit her sister, and on her return reported that the HMV radiogram had at last broken down. It had been agreed that I would pay a visit to repair it. Which is how I came to be ringing her door bell that morning.

Dorothy answered and gave me a welcoming smile. When Dorothy smiles you know you're being smiled at. I've never really got used to those enormous brown eyes, those generous lips and perfect white teeth. She always seems to have a look of surprise on her face, and very nice it is too, except that is when she's addressing her son Fraser. A state of war has existed between them for several years, and there seems little likelihood of a truce at this late stage.

"Come in Les. Try not to tread on Tiny (the small dog) and steer clear of Gillie - she's been playing with the hedgehogs again and is full of fleas." Gillie is another small dog, though not as tiny as Tiny. "Keep away from Fraser too. He's smothered his face with his father's after shave again and stinks of the muck. Can't think why the girls keep phoning up for him. Queer taste some people have. Can't think what they see or smell in him."

"Henry Cooper says it works" growled Fraser.

Sensing that a battle was about to begin, I decided it was time to start on the radiogram. Switching on produced

a click and an audio hum, so the trouble was probably in the i.f. stages and with a bit of luck it would have AF117s in it. Easy to deal with - with a bit of luck. I removed the long rear cover.

"What do you think it is Les?" asked Fraser. "A bit of AF117 trouble?"

I looked at him amazed. "What makes you think that?"

"It said it was likely in that daft little book you wrote called questions and answers. You've probably forgotten and I don't blame you. I just looked in the back and saw some transistors that looked like them."

I couldn't agree with him of course. "No Fraser, it's probably the double diode triode's load resistor that's gone high in value."

Fraser looked at me for a long time. He's got a nice line in repartee. "Bullshit" he said.

The battle between Dorothy and Fraser then flared up briefly before Fraser got the message and went off on his bike. Meanwhile I'd crept behind the radiogram and carefully snipped the screen leads of the AF117s. The radio then boomed to life. In case you're wondering about this, the screen connection tends to short internally to the collector.

"I do apologise for Fraser" said Dorothy. "Don't know where he gets it from. Even his dad's a gentleman compared to that horror. He argues with his father about motor bikes. It never seems to stop. I can't bear it much longer. I've asked the doctor for some drop dead pills, but I'll probably end up by taking them myself..."

I packed my bag as quickly as I could. "I'll be off now Dot. Just in case Fraser comes back."

I told Honey Bunch about Fraser when I got back. She cheered me up no end. "Fraser starts work next week. At the builders on the corner." Fraser working, thirty yards away...

## Another Disaster

Another Wally. When Walter came in carrying his Thorn 9600 I knew I was in for trouble. Not from the set I hoped. It's his way of rambling on about the old days. At the outbreak of war, before we both joined the Fleet Air Arm (that answers a few questions, doesn't it?). Wally said that the sides of the picture were bowed in, so naturally I thought of the BY298 in the EW modulator circuit. It does lead a hard life. So I turned the set on its side, slapped a BYX71 across it on the print side, and snipped the suspect from the top.

I turned the set upright and switched on. There was still slight bowing, but this was easily corrected by the presets on the small correction panel. The upsetting thing was that everything on the left side of the screen appeared in the wrong colours. People on the left-hand side had blue faces and didn't become normal until they moved to the centre of the screen. I questioned Wally about this, but he maintained that everything had been fine until I'd upended the set. I was not inclined to suspect the decoder, but did have fears about the shadowmask. If it had slipped, would it go back or did it need help? I turned the set up on the opposite end and gave it a sharp slap.

"Oh charming" said Wally. "I bring my set in for repair and you bash it to bits."

On the level the picture remained the same. With blue faces on the left. I didn't know what to do. So I muttered something about leaving it to bed itself in for a while.

This gave Wally the opportunity to tell H.B. about the time when we were both operators (projectionists) at the Majestic cinema (now ABC 1, 2 and 3) at the beginning of 1940. I'd been there only a couple of days and hadn't had a chance to get to know where everything was. It was the chief's day off, and as the second was having his tea break I was in charge. It was the organ interlude. Up came the mighty Crompton, with Tom Linn playing it. Wally showed the slides so that people could sing, and I kept Tom in the spotlight. The final slide was shown and it was time for the organ to descend again into the depths from which it has sprung some ten minutes before. Nothing happened and Tom looked around and up at us. People began to laugh as they realised that the organ was there to stay. It was up to me to do something however. After all I was in charge. "Close the tabs Wally" I bawled, "I'll nip down and see what's wrong." Or words to that effect.

So I rushed down the ten thousand stairs, knocking over the ice cream girl (complete with tray) on the way. Down into the stalls, through to back stage, down into the organ

room. Still strangely empty. I looked around at all the fuse boxes and my heart sank. Too many. But something had to be done and done quickly. I pressed the buttons near the motor, but nothing happened. No juice to the motor. Then I saw a handle on a clip at the rear of the motor. There was a clip to engage a gear for manual operation.

Quick as a flash I inserted the handle and engaged the gear. I turned as fast as I could but it was a pretty low gear. I turned and turned and the organ came down an inch or so. Couldn't turn any faster and all of a sudden my hand slipped. The handle whizzed round and the organ gathered speed on its descent. Faster and faster it came. What if? The organ was by now out of sight of the audience, and again I had to do something. Stupidly I tried to grab the spinning handle. Incredibly it stopped – it must have been a very low gear. And so I was able to wind Tom down the last few inches, while Wally'd got the news on the screen. By this time I was flaked out across the motor.

The next day the chief informed me that it was only a fuse that had failed, and that I should have checked them first. Willy Stagg was his name.

When Wally had completed the tale the blue faces on the left of the screen didn't look so blue, so with a certain amount of trepidation I told him to take it away as it would find its own level. It did.

## ***Servicing the Philips TX Chassis***

***John Coombes***

The Philips TX monochrome portable chassis has been in production for several years and large numbers have been sold in the Philips and Pye model ranges. There have been several versions, with 12 and 14in. tubes, and with/without remote control. There have also been a number of modifications – most of these are of little significance from the servicing point of view, though it's worth noting that a simplified field generator stage is used in later production.

### **Power Supply Circuit**

As with any set, the power supply is the key to what goes on. The circuit of the TX's power supply, which consists basically of a transformer-fed mains bridge rectifier followed by a series regulator, is shown in Fig. 5. This is conventional though there are one or two points worth noting. First, one of the diodes in the bridge rectifier circuit, D110, also serves as the reverse polarity protection diode on battery operation. Switch SK2 is part of the battery input socket. This can cause problems, as we shall see. Secondly the error detector/amplifier transistor TS112 is operated from the line output stage derived 26V boost rail. This provides protection against excessive voltages in the line output stage, since excessive boost voltage will cut off TS112 and in turn TS111 and TS110.

In the event of line output stage failure, TS112, TS111 and TS110 will again be cut off. The result could be excess voltage on the 10·8V line which will also be unstabilised, i.e. fed via R110 only. This would damage the tube, whose heater is connected across the 10·8V rail. To avoid this situation, diodes D115 and D116 conduct when the line output stage is not working, thus reducing the voltage on the 10·8V line. These diodes were not fitted in early production sets.

The fourth transistor TS113 provides the tuner with a

stabilized 11·3V supply. The tuning voltage is stabilized by a TAA550 in the usual way.

### **Line Timebase**

The line generator circuit (Fig. 6) is rather unusual. The first transistor TS380 provides the flywheel sync action: a line-frequency sawtooth is applied to its emitter while the line sync pulses are applied to its base. Following the flywheel sync filter, TS392 sets the voltage conditions in the line hold control network. The oscillator itself consists of TS390 and TS391 which are connected in an emitter-coupled astable multivibrator configuration.

The driver and output stages (Fig. 7) follow normal practice. D450 is the efficiency diode, D451 the boost diode, C451 the boost reservoir capacitor and C450 the flyback tuning capacitor. The output stage provides 9·5kV e.h.t. for the tube, a 350V supply for the tube's first anode, a 95V supply for the video output stage and the tuning system, and the 26V boost line.

### **No Sound or Raster**

If there's no sound or raster, check the voltage at the emitter of TS110. If there's no voltage here, check the fuses – VL100 (on the mains transformer), VL110 and VL111. If VL100 or VL110 is open-circuit, check the bridge rectifier diodes D110/111/113/114 and the protection capacitors C116-9 for shorts and if necessary the mains transformer T110 for shorted turns. If VL111 is open-circuit, the l.t. reservoir capacitor C112 could be leaky. Alternatively there could be a short-circuit in the line or sound output stage. Check the output transistor TS450, then D450, C450 and the scan coupling capacitor C455 in the line output stage. Check the smoothing

# The Passing Over of Tiny Tim

Les Lawry-Johns

Tim lay awake in his little bed, wide awake, while his wife Tinker Bell slept soundly beside him. He couldn't sleep and had no idea what time it was. Then he did. The first blackbird started up the dawn chorus and chirped away, calling all the others to wake up and stop Tim from sleeping. It wasn't even dawn.

"That blackbird's got his clock wrong again" thought Tim angrily. He now knew what time it was. It was 3.40 a.m. What a time to start singing and soon to start work. Those birds must be daft. It always seems to be the same in June. Birds awake half way through the night.

Tinker Bell stirred, murmured sleepily, and promptly dropped back to sleep. Tim couldn't sleep though. It was June and the television had said last night that Clive Sinclair had been awarded a knighthood in the Queen's Birthday Honours list. What would Tim get? An OBE at least. Perhaps a peerage. You never know what the Queen might decide. After all, Tim had been a good boy for a long time, a very long time. Tim drifted into a troubled sleep, thinking about the times he'd been bad, very bad.

He woke to find his wife standing by the bed with his breakfast and the morning paper. Tim grabbed this eagerly. Pausing only to shovel some scrambled egg and toast into his mouth, he scanned the columns of names of those who were to receive honours. Lots of familiar names, some perhaps who deserved honours, but nowhere did he find mention of Tiny Tim.

## Overlooked

At last he had to admit that he'd been overlooked for another half year. What could the Queen have been thinking about to overlook him yet again? As her father had thirty years earlier.

Tim sulked. He'd waged a thirty year war single-handed against inflation and this was his reward. Thirty years ago he had charged three pounds to repair the average telly. Then it was half the peasant's weekly wage. Now what did he get? He still charged them much the same, perhaps a little more here and there, but not a lot more. What if he charged them half their weekly wage now? He wouldn't get any work, that was for sure.

He lay in his bed fretting, while the rest of the working world went about its business. He heard the shop door open, and the sounds of a TV set being brought in. He panicked out of bed, pulled on his clothes, combed his little locks and strolled downstairs, trying to look as though he'd been about for hours.

## Mr. Pedalcar's Bush

Mr. Pedalcar stood there patting his Bush T20. Before Tim could bid him good morning, Mr. Pedalcar launched into a tirade. "You put what you called a tripler in this set last month and ever since we've had white streaks coming from anything that's at all light. I'm going to take you before the race relations board. Ha, ha, ha."

Tim smiled weakly and put the set up on the bench. It was as Mr. Pedalcar said. Everything light had a thin white streak shooting over to the right. Something stirred in Tim's little mind, but it wouldn't come through.

"Only since you put that thing in" Mr. Pedalcar repeated.

So Tiny Tim fitted another tripler just to show him that it didn't make any difference. He then checked the 330Ω resistor connected to the tripler to ensure that it was the right value. It was.

"Call back later, Sir. I'll get at it as soon as I've taken the dog for a walk and had a think."

Left alone Tim thought awfully hard, but nothing happened. He tried this, that and the other, but the streaks remained. He then called his friend Geoff, who knows all about T20s and other funny things. "Bugged if I know" said Geoff helpfully. "Whenever I get trouble on a T20 signals board it always turns out to be a chip."

Tim was ever so grateful, and something stirred again in his wonky memory. He stared at the signals board and especially at the TCA800 demodulator/matrixing chip. He removed the suspect and found a replacement lurking in the i.c. cabinet. This was fitted in a trice, and Tim switched on confidently. "If the Queen could see me now" he thought.

On came the picture, completely free of nasty streaks as Tim knew (hoped) it would be. Then he remembered. He'd read in *Television* (Tim reads most of the articles in *Television*, apart from those that are too complicated for him) just this fault described, along with the advice to change several items including the chip. Funny how he can never remember before the agony, only afterwards. Tim swore an oath to read it more carefully in future, if he could.

## Another Bush

The next one wasn't a confusing T20, merely an older A823. As everyone knows, these are no trouble at all to anyone with a grain of common sense. The owner described the symptoms and asked for an immediate diagnosis, which he got. Apparently at odd times the width would decrease, with curved edges and a bright kink (undulating) down the centre.

"It's going into overdrive" explained Tim. "With a possible loss of smoothing."

"Ah" said the owner, impressed with this display of expertise.

"Call back later" said Tim. "It'll be ready by five o'clock."

Left alone Tim fretted and sulked a bit, because he'd no idea what could cause the trouble so intermittently. He switched on and watched the picture appear with a foldover down the centre, just as he'd been told. Then the picture corrected itself and remained good until Tim changed channels. The fault then returned for a few seconds.

He clipped smoothers across smoothers, then decouplers across decouplers. Still the same. He remembered his first diagnosis (going into overdrive) and his eyes narrowed. If the damping components across the primary winding of the line driver transformer were to become open-circuit intermittently, the drive to the line output transistors would be distorted. This was it. The resistor seemed o.k. on test, but Tim noticed that the capacitor in



series with it leaned against the resistor, which normally runs hot. Ah, ha. He replaced the capacitor with a flourish and beamed at his expertise. There was no change. He crept into the corner and cried. Tinker Bell found him there and gave him a cuddle.

Feeling better, he had another try. What rules had he forgotten to follow? Ah yes, the colour prejudice rule. If capacitors are red or green and big, suspect them. If they are smaller and black, replace them. Tim looked and found a small, black 10 $\mu$ F electrolytic that decouples the emitter of the line oscillator transistor 5VT6. He whipped it out and checked it. As it didn't seem to feel well he fitted a replacement which was also black. He applies the rule only when it's convenient you see. The picture stayed steady for an hour. So the job was deemed done and the set was collected and carried away.

It was carted back the next morning. Lacking moral courage, Tim changed the complete panel. This cured the problem and he resolved to have another go at the faulty one another time when he felt better. So far he's felt groggy every day, so he still doesn't know what caused it to go into overdrive.

### Ups and Downs

Tim had been reading his *Reader's Digest*. He'd come across a snippet reprinted from the *Daily Telegraph* — sent in by a Mr. J. W. Reid. It made Tim think, which is something he's not used to doing. So he thought he'd have a go at Tinker Bell.

"After you've washed down the breakfast things, you can go out and wash up the car." T.B. gazed at Tim for a long time.

"You've got that wrong dear. After you've washed up the breakfast things, you can go out and wash down the car."

Tim sulked a bit after this, then had another go.

"The cat hasn't eaten down her food." Tinker Bell joined in the confusion. "I think you're getting a little mixed down love." Tim saw that it was game down and gave . . . "And don't forget to fill down the form that came yesterday."

### The World's End

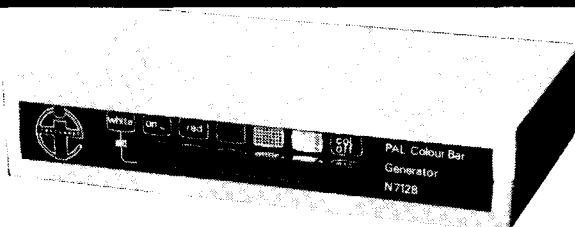
If you take your dog for a walk to the top of Windmill Hill and look across the river to Tilbury, you can see The World's End just to the right. Tiny Tim was talking to his dog. "In that pub over there, there's a dog even more queer looking than you."

Ben wagged his tail and Tim continued. "It's a cross between a Jack Russell and a Labrador. Since his father was the Jack Russell, the queerness doesn't stop at the dog's appearance. How could a little . . . ? Ben wagged on. He clearly knew the answer but wasn't saying anything. Tim rebuked his dog sternly.

"How can you look so knowing? When we tried to mate you with a very pretty Collie at the very height of her hotness, all you did was run around cocking your leg up everywhere until a dirty old mongrel jumped over the fence. We got a right old lollicking from the owner when the puppies were born."

Ben lowered his head and walked home on his own. Tim followed, saying how sorry he was, afraid that Ben would tell Tinker Bell who would no doubt put her hands on her hips and comment "he's a fine one to talk . . ."

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cathode of the field output valve by replacing its 270 $\Omega$ , 2W bias resistor with the circuit shown in Fig. 3.

I haven't bothered to extract an audio signal, finding it easier to take this from the audio output socket of a 625-line portable receiver tuned to the same network. A suitable signal should be available across the set's volume control however.

### Playback

Having recorded our 405-line video, we next have the problem of playing it back. Those wishing to demonstrate vintage TV receivers will need to use a modulator to the system A standard.

The u.h.f. output signal from the VCR will be to the system I standard but with 405-line scanning. Many dual-standard receivers have their timebase and i.f. switching on separate panels, and it's fairly easy to separate the switching so that only the timebase is switched to 405. I

use this technique with the V849 and the photos show the excellent off-tape results. As a 405-line signal requires a bandwidth of only 3MHz, the VCR's reduced bandwidth is not so detrimental as with a 625-line signal — the subjective definition with off-tape 405 is actually better than with off-tape 625.

### Drop-outs

There is one problem however. The drop-out compensator consists of a 64 $\mu$ sec (one line at 625) delay line arranged so that if a drop-out is detected the information from the previous line is switched in to replace it. Obviously if a line is 98 $\mu$ sec long, as with 405, the wrong information will replace drop-outs. This is clearly shown in the second picture, where a drop-out to the left and right of the I has been replaced with information from the 1 and 0 on the previous line. Apologies for the ghosting on the picture — Band III is like that in this area.

## Tiny Tim's Long Hot Summer

Les Lawry-Johns

It was the month of July and Tim's magic thing said 30. He tried to work this out, at something like 90° in the shade, and felt even hotter. As he sat there behind his little counter, trying to avoid doing anything that might raise his temperature even higher, a young couple came in — carrying a GEC colour set.

### The GEC C2233H

Tim noted the set (Model C2233H) and noted the young man. His eyes then became glued to the girl. A sort of Farah Fawcett lookalike, wearing high heeled sandals and the shortest of short skirts. Her eyes were sparkling and she smiled, showing her perfectly white teeth, as she became aware of Tim's rude scrutiny.

Tim smiled back and revealed his yellow tusks. The girl's smile froze and she shivered. So Tim turned his mind to other things.

The set was one of those fitted with the 20AX tube. The ones in which the BU126 chopper transistor gets ruined when the 150k $\Omega$  chopper driver bias resistor goes high in value. "Is it dead?" he asked the young man. "Oh no" was the disappointing answer, "it's just that there's a blank white screen."

Tim whipped the back off and surveyed the unfamiliar RGB output section on the upper left side. "Complementary-symmetry output stages" he muttered, as though he knew what he was talking about. The tube's cathode voltages were very low, but there was full h.t. at the emitters of the top transistors, so Tim's tiny mind thought that these transistors were not being turned on. He looked at the circuit and noted that R281 (Mk.II decoder) is common to all three stages as part of the bias network. Snip, snip he went with his little cutters, and slapped the meter across the prostrate resistor. Infinity — bullseye! He looked and looked hard but couldn't seem to find a robust 82k $\Omega$  resistor, so he put in two 47k $\Omega$  ones in series.

The picture was a joy to behold, and he sneaked a glance at Miss Fawcett. Her previous look of disdain had been replaced by a look of admiration and the white teeth

glistened at him once more. "How did you do that?" she gurgled. "It just comes natural to me" said Tim modestly.

"It's no good getting old if you don't get crafty" said the young man. "I suppose it's dead easy when you do the same thing day in and day out year after year."

"Why don't you try it if it's so easy?" growled Tim.

"I believe in working for a living" said the young man. "How much do we owe you for that little job?"

"Make it a tenner since you've been so nice to me" replied Tim.

"WHAT!" bawled the girl. "The last place that repaired the set worked on it for a week and charged us only twenty." She now looked ugly instead of alluring, and Tiny Tim felt sad. "Surely it's worth paying for the job to be done on the spot?" he protested.

The young man produced a wad of notes. "Shall I pay him or not?" he asked the girl. Clearly she was the boss, and Tim was glad she didn't belong to him after all. "Pay him and put the set in the car" she ordered. "Let's get out of here." She was still saying something as they carried the set out, and Tim was shocked by the language. Tinker Bell didn't swear. Only when it slipped out. She was lovely and kind to everyone, or nearly everyone, and was pretty with it. Tim was glad he had her to look after him and cuddle him on cold nights. These hot nights were a bit of a curse.

### On Heat

"Funny thing heat", mused Tim. People go out in the sun with nothing on and get all burnt up. If they're white. He remembered when he was all brown, sailing his little boat in the bay of Alex, and the girls in No. 17 calling him blondy. Oh well, so much for people. What about sets?

CVC9s blowing their mains filter capacitors all over the place. What a clever boy he was keeping plenty in stock. Tim wondered about his. He always orders lots of bits and pieces so that he can do jobs quickly, and it costs him lots of money. He wished he was clever so that he could earn more, but that requires thought and energy. Thinking is difficult if it's to do any good. As to energy, that was

something Tim only thought about. Doing things puffed him out.

### **The Thorn 9000**

A nice lady then came in with the aid of a walking stick. Would Tim get the TV out of the car? She would call back later to see how he was getting on. So Tim puffed his way into the shop carrying the Thorn 9000 and put it on the bench. The lady went and Tim had to stop thinking his soppy thoughts and concentrate.

When the set was switched on the e.h.t. built up then collapsed, built up again then collapsed. Tim concentrated hard. "Something is making it do that" he thought. He noticed some smoke coming from the tuner panel. "Ah ha!" It was the 12k $\Omega$  h.t. feed resistor to the tuning voltage stabiliser. It looked cooked and read only 5k $\Omega$ . "Bloody carbon resistors" thought Tim crossly. He put in a 12k $\Omega$  wirewound that he kept for the Pye hybrids and switched on confidently. The e.h.t. built up and collapsed, built up and collapsed. A closer inspection was called for.

He checked the fuses and found F4 open-circuit. This is the 1.6A fuse in the 24V line, nothing to do with the cooked resistor. He measured the current across the fuseholder and found it was not excessive. So he checked all the diodes in the syclops circuit with the set turned up and the chassis withdrawn. None were shorted and none were open-circuit. There were no dry-joints. He put the set the right way up and disconnected the tripler, which was a new one he'd fitted a few months earlier. The set still huffed and puffed.

"Bloody thick-film unit" thought Tim. Then he caught sight of a diode he'd not checked. The SKE one in series with the syclops transistor VT701 – bolted to the side of the heatsink. Dead short. Tim was glad he kept lots of them in stock. He fitted a new one and a 1.6A fuse and the set now worked perfectly. Tim wondered about this but found it very trying, so he stopped thinking about it.

When the nice lady came back Tim was upstairs laying on the bed because he was puffed out. When he heard Tinker Bell talking to her however he came down and put the set back in the car. This puffed him out again. "I could have done that instead of you straining yourself" grumbled Tinker Bell. Tim thought this was ever so nice of her and gave her a hug before going upstairs for some more rest. He'd hardly laid his little body on the bed when someone else came in, so down he went again, now convinced that all this running up and down stairs was what was puffing him out rather than carrying the sets about.

### **Desaturation**

"My husband and I put the set in the back of the car before he went to work. I can't possibly get it out. Perhaps you can do it?"

"Certainly madam." Tim went out to the car on the forecourt and looked at the set in the back. It was an ITT CVC2. You know, one of the heavy ones. Tim put one hand under the near end and stretched his little arm over to the far end and heaved. Nothing happened. So he heaved a big heave and managed to get the set out with the far end resting on the seat. He was now able to get at it from the front, which was far more comfortable, and soon had the beast on the bench. Tim took the lady's address so that he could deliver the set when it was done and save

them lugging the thing in and out etc.

"If you don't get it done by the time you close, could you let us have a spare colour set so we won't miss Coronation Street tonight?"

"All right" said Tim. "What's wrong with this one?"

"The colour is there some of the time, but when it is there's a strip down the left side without the proper colour."

"Oh dear! I mean right ho," said Tim. "We'll get it back to you as soon as possible." Tim felt dubious. He'd repaired many of these fine sets but had never had to do battle with the decoder.

The lady departed and Tim started – to sweat. Just in case you don't know, the CVC1 and CVC2 were wired sets, with no pretty printed panels and numbers to identify everything, i.e. it ain't easy.

First of all Tim found a layout of the decoder with the items marked, then he turned to the circuit diagram which seemed a bit complicated to his little mind. With the set switched on the colour seemed to be in order except for a desaturated strip down the left-hand side, as the lady had said. He checked the burst signal, which was correct, and the tuning of the ident coils Ld24/5. Altering the position of the core brought a green band down the right side before the colour was lost, so Tim returned it to its original setting. He then tried setting up the reference oscillator, which was already correctly set up. Then he galloped around every adjustment there was, all to no avail. So he checked the transistors and found one that had a rather high base-emitter reading, higher than the base-collector, but not much. It was the first burst amplifier transistor TXd13, a BC118. Tim didn't have one of these, so he tried a BC108 which had equal readings.

There was now no colour at all. So he replaced the BC118 and there was still no colour. This made Tim angry, so he shorted out the colour killer and the colour appeared as bands. He set the oscillator and the colour was good, except for the strip down the left-hand side, and Tim started thinking funny things.

One funny thing was the absence of a degaussing buzz when the set was switched on. So he checked the VA8650 posistor and it came to pieces in his hand. He fitted a new one and switched on. The degaussing coils now hummed (the tune sounded like Bang Bang Lulu) and the picture slowly appeared as the valves warmed up. The desaturated band on the left-hand side was still there.

The combination of the July heat (still over 90) and the frustration made Tim somewhat delirious as he vainly tried to mop up the sweat. "Would you like a cold drink?" asked Tinker Bell. "A hot coffee" said Tim, hoping that the hot drink would finish him off and end the suffering.

"Don't forget you put that funny transistor back in" said Tinker Bell. But Tim wasn't listening (he rarely did) because he'd caught sight of some small electrolytics of a type he hated. He disconnected each in turn and tested them. All were in order so in the end he refitted the BC108 in place of the BC118 and the band disappeared.

"I've done it!" he croaked. He removed the short across the colour killer and the colour remained. Until he changed channels, when the colour was lost, even when he reverted to the initial channel. He cheated. He replaced the short across the killer and left it there. He delivered the set and told the lady to turn down the colour control when watching monochrome.

"We always have done" said the lady.

Tim didn't feel so guilty as he left the house, wiping the sweat from his little brow.

confusing, then replace as necessary. In the edition II version of the KT3 R1456 becomes R1587.

### Poor HF Resolution

If the picture is not as sharp as it could be, a fractional adjustment of the tuner's i.f. output coil is required -

never more than a quarter of a turn. No problems have been experienced with the i.f. module to date.

### Tuner

The U321 tuner unit should be replaced if the fault is low gain, cross modulation, etc.

# 365 Days Shalt Thou Labour

*Les Lawry-Johns*

That's not quite true of course. We don't exactly labour, because things have been quiet for some considerable time. During the working week that is. Today's sets are far more reliable than those of yore, so there are fewer repairs. Sales are at such a low ebb that when they do occur the wisdom (and ability) of buying replacement stock comes into question, the current account being constantly eroded by rates, taxes, water charges and all the other overheads.

So when a relative of a friend phoned on a Saturday to ask if he could bring his Philips colour set over on Sunday morning, since he lived some twenty miles away and this was the only chance he's got, I agreed. "After ten and collect it well before twelve" I told him. Thinking it would be a G8 or a G11, I didn't see any problems.

### A Fiendish Philips

I had a distinct shock when he arrived at ten fifteen with a large set in the back of his car. It was a 26in. set of Swedish manufacture. Fitted with the K80 chassis.

My peace of mind was shattered when he said there were quite a few things wrong. Lack of width (no trouble I thought), no control over the brightness (oh dear), contrast control not working and colour funny (bloody 'ell). "I'll be back at eleven fifteen, Les." Gulp.

I started at the wrong end of course. Let's get the width right first I thought. The circuit of this beast is fearsome - no kidding, it's horrific if you're not familiar with it, and who is? At least I had the manual, but shock followed upon shock as I perused it, which is difficult if your eyes are trembling. I started by changing the two parallel connected PL509 line output valves and the PY500 boost diode. No change. The line drive was, er, odd. So I decided to have a go at the uncontrollable brightness and contrast - in fact there was no contrast, the modulation consisting of chroma only, so that when the colour was turned down all we had was a bright, blank raster. "Fancy that" I thought.

When time is pressing it's not easy to examine the circuit carefully and make the proper checks. But I tried and found the voltages in the video circuit haywire. "Ah ha" thought I. "Why are they haywire? Something's obviously wrong somewhere." With that profound thought I stopped thinking and merely checked voltages. My fruitful search was diverted by seeing that a PCF80 was used in the brightness control circuit. So I fitted another, which made absolutely no difference. I resumed the voltage checks in this area and found that there was no negative supply at R934. This is the -1 (-8.8V) line from the power supply panel, which is bolted on the lower front of the main frame. It's a bit awkward to get at, but checks

suggested that there was no positive supply coming from the relevant l.t. bridge rectifier. Removing the panel confirmed this - the BY164 was open-circuit at the positive end.

A new one was quickly fitted and order was restored - full width, control of brightness, full contrast, the lot. Only minor adjustment of the grey scale was required. The trembling subsided and my eyes could focus if I took off my specs. I was free. At only eleven o'clock. But what was this?

### Another Mindbender

A car had drawn up outside and a chap was lifting out a G11. No problem thought I. "It's had a new line output transformer, output transistor and several capacitors, but it's still blowing the h.t. fuse and we can't find out why." So off we started again.

A cold check at the h.t. fuse produced a reading of over 5k $\Omega$ , so there were no direct shorts. A meter switched to the 500mA range was clipped across the fuse and the set was switched on. Clonk. The line output transistor was unplugged. Try again. Clonk. The edge contacts to the line timebase were removed. Another try and another clonk.

So the trouble must be on the power supply panel. But the only thing after the fuse is C4040, the 47 $\mu$ F h.t. decoupler. The 5k $\Omega$  reading was still there, so we removed C4040. I was surprised to find that it appeared to be reversed, i.e. positive to chassis. Surely I must be wrong? On test it read perfectly the right way round, 5k $\Omega$  when the leads were reversed. It was put back in correctly. Correct meter reading. Refit the line output panel plugs, plus the output transistor plug. The set now performed perfectly. Fit 1A fuse and everything O.K.

The gentleman left with my curses ringing in his ears. I think the culprit is a reader. Are you listening out there? Only I'm allowed to do things like that, you're not supposed to . . .

### Christmas Day in the Workshop

You may say that working on a Sunday morning is no great sweat, and if it doesn't last too long it isn't. But it would be nice to have one day off a year. Not entitled? O.K. What about Christmas Day though, surely . . .

No. At 7 p.m. Fred phoned. "Les. I've got company and the set's gone on the blink. Be a pal and do it for me." Well, we'd sold him the set years earlier, so we told him to bring it along. At 7.30 p.m. he arrived. We whipped the back off, snipped out the mains filter capacitor, fitted another and a new fuse. "O.K. Fred, now off you go."

"Well done Les. Take a pound for your trouble. It's

worth it to me."

"Merry Christmas Fred. Mind how you go. There aren't many left like you."

### **Come Easter**

He phoned again on Easter Sunday. This time his radiogram had gone on the blink and once again he'd got company. "We'd rather listen to records than watch television when we've got company."

He brought it along, upside down, in the back of his estate car. We did the job noting that the spindle was missing, assuming that he'd removed it for the journey. The next day (Easter Monday) we heard from him again. "Les. I didn't phone you yesterday because I didn't think it fair to disturb your holiday, but you've got my record spindle."

"I haven't got your spindle Fred. The set was brought in upside down, so the spindle is probably under the record deck. Lift it up and get it out."

"I don't like to do that. I'd rather you ran over with one and fitted it. After all you're the one who lost it."

"I didn't lose it Fred. You've still got it and as it's an old Philips one I haven't got a replacement."

"What can I do then?"

"Lift up the deck and get the spindle out. If you can't do that, stick a pencil in the hole for now. A short, round one. You can play the records one at a time. I'll nip in and fix it when I'm passing. Cheers Fred."

As it happened I found an old Philips spindle and gave it to Fred when I saw him some time later. Fred phoned: "it won't go in the hole."

I had to make a call in his locality some time later so I popped in. His wife was there. "It's been heaven without those old records of his."

I lifted up the deck and found the spindle. It wouldn't fit in the hole. Fred had rammed a piece of wood down inside and bits of it were still clogging up the bottom. After a struggle I got the pieces out and fitted the spindle. It worked O.K. and his wife wasn't pleased at all.

"I knew you had it" Fred said when I saw him. It's August Bank Holiday this weekend. I wonder . . .

### **Old Records**

A couple of chaps came in and were talking about their very old 45s dating from the fifties. My goodness, they should see some people's collections of 78s. Norman Stevens had such a collection. Remember Norman? The present editor is also reputed to believe that the only proper recording medium is shellac.

My first clear recollection of a record was of the Bing Boys singing "We didn't want to fight but by jingo now we do." This referred to the Crimean War I believe. What do I remember of it?

"The dogs of war have looked for the eagle of the south.

About to throw defiance in the British Lion's mouth.

They're asking for a thrashing, and a thrashing they will get.

Britannia's not prepared to take an insult yet.

We didn't want to fight, but by jingo now we do.

We've got the ships, we've got the men, and we've got the money too."

Well, you asked for it. You can have "The Charge of the Light Brigade" if you want it . . .

# next month in

# TELEVISION

## ● PRACTICAL PRESCALER MODULES

Two designs for handling 150-650MHz and 150MHz-2GHz inputs. The latter is part of the frequency counter-timer project featured in our April 1983 issue. Due to the cost of the chip required however a much cheaper alternative that works at up to some 650MHz is presented.

## ● SERVICING THE THORN 1600 CHASSIS

These 17in., transportable sets were introduced in 1974 and remained in production for several years. John Coombes provides a detailed servicing guide.

## ● UNDERWATER TV

The use of TV in underwater applications presents novel problems. The external pressure necessitates strong, compact cameras. Control during inspections is also a problem, since viewfinders are not practical. Thus tough, multicore cables must be used. An interesting subject dealt with by our CCTV expert Peter Graves.

## ● ADDING CONTINENTAL SOUND

A switched 5.5MHz continental sound capability can be added to most modern TV sets with little difficulty. The design presented employs 4066 CMOS switches and can be used with either ceramic or discrete LC detector tank circuits.

## ● SERVICING FEATURES

VCR Clinic and TV Fault Finding, plus S. Simon's Quick Checks Q and A, this time on the Thorn 3000/3500 series.

## ● THE CVC1200's PSU

A feature of the current large-screen ITT chassis is its unusual discrete component switch-mode power supply, which also provides mains isolation. Its mode of operation is not easy to see at first glance and there's no description in the manual. Hence this brief account of its workings.

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# Who's Cognizant?

**Les Lawry-Johns**

I used to be, but it seems I no longer am. This makes even the most simple job long and tedious.

For example I spent a lot of time trying to find the cause of horizontal black lines appearing intermittently across the picture of a Bush set fitted with the T20 chassis. At last I gave up and sent the chap off to Geoff for a second opinion. Within an hour Geoff phoned to ask me if I was all there as he'd put it right in minutes. It was the tube base arcing at the focus pin of course. We all know that one – I keep a dozen tube bases in stock for just this reason, and often lend one out to the simple souls who omit to do so. But I didn't recognise the symptoms myself (cries of "retire, retire!").

## No Sound

Then look at last Sunday morning. We are around for only an hour or so while we make up (cook says Mr. Lord) the books and clear up the mess left over from the Saturday madness, before we make ourselves presentable to go and collect the sea food and play our Sunday card game. Just as Honeybunch and I were playing an innocent game of truth or dare however this chap came in with a Thorn 1590 portable (Ferguson Model 3816). He said it had no sound or picture.

Without further ado I whipped off the cover shell and checked the I.t. fuse. It was o.k. So I checked the mains input fuse, which was also o.k. Next I plugged in and switched on. The tube lit up and so did the screen. With an aerial connected it produced a good picture.

"Fancy that" said the chap, but I was already on the track of the no sound condition. Check the speaker and headphone socket. Check the voltages in the audio output stage, then in the bias, driver and audio amplifier stages. I injected an audio signal at the base of the audio amplifier transistor. Loud and clear... So I began to think dark thoughts about the preceding chip. Before going further I injected the signal at the centre tag of the volume control. No sound. Turn up the volume control and the sound is loud and clear. "Had to make sure" I explained, "why don't you take it to an expert next time instead of a moron like me?"

## The G11

Now everyone knows their G11s. I mean everyone. A lady phoned to say that her Philips CTV had broken down with a white line across the screen and that she couldn't bring it in because it was too heavy. So I arrived with a complete case of G8 and G11 spares. It was a 26in. G11. Now any fool knows that field collapse is due to the TDA2600 i.e., with perhaps the 800mA fuse gone as well, and that the 470 $\mu$ F h.t. reservoir capacitor is possibly responsible for the chip and maybe the BU208A failing.

I whipped open the spares box and rummaged around for a TDA2600. Looked here and there until she picked one up and asked "is this what you're looking for?" Oh dear, but I took it from her gratefully. Next unsolder the heatsink and remove the faulty chip. The solder hadn't

been disturbed, so I presumed it was the original one. I was surprised to find one pin folded upon itself: it had obviously made contact, so I fitted the new chip and checked the fuse which was intact. The 470 $\mu$ F reservoir capacitor was a red one and had been sparking at the rivet. In went a new one. "This would have caused you trouble later" said I, "so it's better out than in." "Of course" she agreed. As all seemed to be in order I switched on. The raster came up with incomplete field scan and collapsed, tried to build up again and collapsed. I checked the voltages: the 40V supply was smooth, but the voltages around the chip rose and fell together. Tried this and that to no avail. "I'll pop it back to the shop where I can check it more thoroughly" said I.

Off came the frame and I lugged the set out to the car, trying not to huff and blow. Back on the bench I checked the associated components, having fitted another TDA2600 just in case. Everything checked out o.k., though the voltages were all over the place of course. The new chip then went short-circuit and blew the fuse. I checked the voltages with no chip in: all were as expected and steady. Another chip was fitted and the comedy continued. The evening shadows fell, my spirits with them. At last I gave up.

In a dream I saw someone holding a TDA2600 with one leg folded up, and wondered what this foretold. Next morning I paid a visit to my friends Don and Raymondo. I told them how upset I was and why. "It's the holder" said Don. "It's the holder" said Ray. What wise boys they are. Of course it was the quill to dil chip holder. The folded up leg on the old chip had opened up the clip so that a new, unfolded leg couldn't make proper contact. All was well when a new holder and a new chip were fitted.

I rushed the set back to its owner. She saw me puffing up the path with it and opened the front door. There she stood, making it difficult to enter. I tried to get past but the set, and she, got sort of jammed in such a way that I felt embarrassed. "Awfully sorry" I gasped. "Don't worry about me, just push through." If it had been a bloke I'd have told him to ... off out of the way, but I didn't like to as she was a lady. So I pushed back on her to make way for the set. It was now obvious to me that she was a lady, but I didn't linger long. In went the set, pulling me with it, while she still stood against the door jamb as though nailed there. I think the edge of the frame just ran down her backbone and she was frightened to move in case she broke in half.

So ended another right muck up. Anyone else would have thought about that folded up pin, but all I could do was to dream about it.

## A Right Pair

Then look what happened when I went to fix a set that wouldn't tune properly. I got it tuned all right, but when I came to leave she asked me (another lady, who's a friend of ours) how much. Didn't want to charge her at all, but I didn't want to offend her either. So I said a pound. She gave me this, commenting that it was obviously not enough for the call, and went out to the kitchen to get something else for me.

She came back with two large pears and suggested I put them in my box. There wasn't room for a peanut, so I put one in each trouser pocket. I felt a bit uncomfortable whilst driving back, but soldiered on. When I got back and went into the shop both legs were soaking wet and my trousers had changed colour. Ever helpful, Honeybunch

said "couldn't you wait?" "Margaret sent us some pears" I tried to explain, showing her what was left.

## Birds

In came this pretty young girl with a radio cassette. So I thought I'd show off a bit and do it whilst she waited. It was used on mains only, so I checked across the plug pins and found that the transformer's primary circuit was intact. Off came the back to check the fuses. Both the mains and the l.t. fuses were intact, so I plugged in to see what we had or didn't have.

There was a.c. from the transformer to the bridge rectifier. There was about 10V d.c. across the reservoir capacitor. A lead went from this point to the mains socket for switching purposes, and there was no output from the switch. "Simple" said I, "got it now." Since battery operation was never used, and indeed there was no sign of a negative lead from the battery compartment, I shorted the switch contacts across, expecting the set to burst into life. It gave a grunt and the 10V reading dropped to zero. "There's probably a short and it's probably blown the fuse" I said, with a sickly smile. The fuse was intact. I removed the screwdriver from the switch contacts and the 10V reappeared across the reservoir. I removed the mains plug and prepared to look for shorts. There were no shorts and the 10V remained across the reservoir. Since the voltage was still present I thought that the bridge had charged the reservoir and that all was well in this department. I again shorted the switch contacts and the 10V fell to zero. "I'll leave it with you then" said the girl, "and call back later. Perhaps you'll have got someone else to see to it in the meantime."

I stared at the set and called it a nasty name, like I call the bird when it goes to bite me. Once again I plugged it in and the 10V appeared at the reservoir. It remained there until I shorted the switch, this time with a permanent soldered connection. There was no voltage at the reservoir capacitor but there was at the output from the bridge rectifier, half a millimetre away. I applied the iron to the seemingly perfect joint and the radio burst into life. How the bridge had charged the reservoir capacitor across a high-resistance gap had once more fooled me.

I mentioned a bird just now. It's taught me the meaning of the term "bird brain" you see. A while ago one of Honeybunch's relatives was posted to Northern Ireland - he's in the army. Anyway, he thought the bird wouldn't be safe, so he gave it to HB who he knew would be crackers about it (true). It's not very old, about six months, so HB says we've got to be patient with it. It's a very handsome cockatiel. HB calls it Crystal and I call in Grumpy, and because of our cat we have to keep him upstairs. So for the best part of the day he's on his own though he gets plenty of attention from six o'clock onwards. HB talks to him continually. "Who's a clever boy then?", "there's a pretty boy" and all that sort of thing. He's yellow and white with orange patches on his cheeks. I add my terms of endearment - "who's a made up ponce then?"

In spite of all this loving attention he remains wary, suspicious and downright spiteful. He pecks through his millet at a great rate then squawks for more. When HB tries to give him more he attempts to bite her. I've told her to put him on iron rations for a week to teach him to be grateful but she'll have none of it.

All right, so he's mentally disturbed. Something nasty must have happened to him when he was younger. Yes. He was hatched.

# next month in

# TELEVISION

## ● THE LUXOR SX9 CHASSIS

The main idea behind the new Luxor SX9 is to provide as flexible a chassis as possible. It will drive 20, 22 and 26in. c.r.t.s, features frequency synthesized tuning with 99-channel access and 29-channel storage, offers teletext as an option, has a scart socket fitted as standard, and with the addition of an extra module is suitable for direct satellite reception. Amongst the circuit features are parallel sound and a Motorola single-chip (type TDA3301) decoder with automatic black level control. Some rather interesting techniques are used in the digital side of the set, and we'll be concentrating mainly on these.

## ● SERVICING THE SONY SLC7UB

The Sony SLC7UB is one of the most complex VCRs to have appeared on the market and can produce some puzzling faults. David Botto provides a guide to various fault conditions, concentrating on the electronic side.

## ● TEST CARDS FOR CHRISTMAS

The festive spirit takes over with the BBC's captions and test cards at Christmas. Keith Hamer and Garry Smith provide an illustrated account of some of the unusual test patterns seen in recent years.

## ● SERVICING FEATURES

We've many hints and tips to pass on in the regular VCR Clinic and TV Fault Finding features. S. Simon deals with the Thorn 8000 and 9000 chassis in his Q and A guide.

## ● AUTO CHANNEL SCANNER

When you've several channels to choose from it's an advantage to be able to monitor them sequentially. For this purpose James Dilworth devised an auto channel scanner system that selects one channel for about ten seconds then changes to the next and so on, each channel being monitored at least once a minute. If an interesting programme is seen, a switch is thrown and the set resorts to normal channel select operation.

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# Letters

## PHILIPS KT3/K30 CHASSIS

John Bourne's article on the Philips KT3/K30 chassis in the November issue contained much useful information. It didn't however mention the most common cause of a dead set we've encountered, simply that the 4.7Ω surge limiter resistor R6291 has a tendency to go open-circuit. It's a wirewound resistor rated at 4W, but doesn't seem up to it. Fit a 5W vitreous wirewound resistor and all will be well.

*Peter Gaymead-Fraser,  
Gravesend, Kent.*

## BERRYVISION 510

The advice given in Service Bureau (November) to the reader requesting help with the touch tuner assembly used in the Berryvision 510 was rather limited. The tuning voltage is taken from the 200V h.t. rail via R19 (15kΩ, 2W) and an SN76550 30V regulator (IC4). These components are both at the bottom left hand of the R1A signals panel. R19 usually goes low in value, the increased voltage at IC4 making it go open-circuit. Replace R19 with a 3W wirewound resistor and IC4 with a TAA550. A voltage

check between tag 5 (brown lead) under R19 on the panel and chassis should indicate 30-32V. The effect of R19 and IC4 being faulty is that more than one, probably all, the LEDs will conduct and light up.

On early versions of this set the earth tag is fixed to the front control panel by a "pop" rivet. An aluminium rivet was used, with the tag tinned and fitted to the copper print. If the rivet is the slightest bit loose and, after all this time, oxidation has occurred between the connections, problems appear. Remove the rivet and fit a screw and nut, with a shakeproof washer between the tag and print, then tighten the screw.

*A.M. Lowson,  
Houghton Regis, Beds.*

## THAT REMOTE CONTROL TRANSMITTER

I was very interested to see the item on remote control trouble with the Philips K30 chassis (TV Fault Finding, December issue). I'd repaired one of these units only two weeks previously because of the same fault – transmitting continuously. I discovered that the trouble was due to a black staining that was building up around the PCB tracks inside the keyboard. By scratching this black stain away the unit stopped transmitting and normal operation was restored.

*J.C. Baskett,  
Totton, Southampton.*

# All Systems Stop

*Les Lawry-Johns*

A couple came in with this T20 just as we were about to shut up shop the other Saturday. Since we all know our Rank T20s like the backs of our hands I said I'd do it while they waited, so that their weekend entertainment wouldn't be affected.

The voltages were low and there was a smell of overheating. I unhooked the tripler, but things were much the same and the line output transformer's overwinding was hot. After whipping out the panel and unsoldering the transformer I gave them a choice – complete new transformer or replacement of the faulty winding. They opted for the winding and before you could say knife it was fitted and the panel restored. I switched on and was glad to see the tube's heaters glowing merrily. Unfortunately the picture was badly serrated with large vee indentations at each side, varying in size and number with the picture content.

Time was zipping by and it had been a long day. So I attacked my spare T20, relieving it of its line output panel. Fitted in the set on the bench it gave a good picture, and the customers went off happily. We were just about to lock the door when a worried face looked in. It was Eric, an old friend who has practised the art of servicing for many a long year.

"What's up Eric? You look right bugged."

"I am, too true I am. Been working on this rotten T20 for a week. It's used up all my BU208s and is breaking my heart. If I leave it with you, would you take a look at it during the week? It's not wanted until next Friday."

His ravaged face told me that he'd been having a hard time, and I knew just how he felt. So we took it in and he

departed, looking so happy now that his nightmare had been shifted. "Cheers Les, see you next week."

## Tuner Transplant

Sunday morning dawned bright and cold. Having taken Ben for his walk I looked at the T20 Eric had brought in and decided to put it off till Monday. Instead I busied myself trying to repair a tuner in a small Sharp portable. The mixer transistor had failed – one of those tiny ones no bigger than a full stop. Putting another one in was not easy but was done. The tuner still didn't work. The fact that the circuit diagram was wrongly drawn didn't help – it showed the transistor's emitter with a lone capacitor in series, which I thought rather quaint. In the tuner the capacitor was across the emitter resistor, as it should be. I didn't have the correct tuner, but as there was room at the rear I fitted a U321 (G11) tuner. This produced a picture, but it was very grainy.

The set belonged to a friend who frequents the "Call Girl", so I was not inclined to give up easily. I checked the a.g.c. line and found that it couldn't be reduced much below 4V. So I hung a preset on the line, to chassis, to determine the right voltage. A good picture was produced with the a.g.c. reduced to almost nothing. Being a coward I left it at that and told Tony what I'd done and where the preset was. After all he's a much better electronics man than I.

## The T20 Saga

Monday dawned, bright and cold. After clearing up a few odds and ends it was time to tackle Eric's monster. The BU208 was short-circuit, so I checked this, that and the other on the line output panel and found that nearly everything that could have been suspect had been replaced – there was a new line output transformer, new tripler, new EW modulator diodes, new tuning capacitors,

new driver transistor etc., so what was I to do?

I fitted a new BU208 and unhooked the tripler, just in case. At switch on there was a brrrump and then silence, except for the twittering of the power unit. Fearing the worst I checked the voltage at the collector of the BU208. Full h.t. The voltage at the collector of the driver transistor was also high, suggesting that the TBA950 line oscillator wasn't working. In fact there was no 12V supply, due to 4R16 (910Ω) in the 12V regulator circuit being open-circuit. A 1kΩ resistor was fitted and the set tried again. The timebase was now fully operative, with the tube heaters glowing. So far so good, but I knew Eric would have checked 4R16 and that something was still likely to be amiss. After reconnecting the tripler the set produced a raster, showing that all was normal. Fancy that I thought.

I plugged in an aerial and the set sort of coughed and lapsed into silence. Again the voltage at the collector of the line driver transistor remained high, so I slapped a 10kΩ resistor across 4C19 to provide the line oscillator with a start-up supply. The set came to life and remained on for eight seconds. It then shut down. I took the 10kΩ resistor out and put it back again. The set came on for four seconds. So I removed the 10kΩ resistor altogether and tried the on-off switch. Each time the set was switched on it came to life for a few seconds – longer if it was left off for a time. "We have a heat-sensitive component" I diagnosed. So next time I sprayed everything with freezer. It still went off.

Something then dawned on me. It had stayed on longer when the tripler was disconnected. I unhooked the tripler and the set stayed on. I looked at the tripler. Brand new. So I removed it and fitter another. Still the same. I connected a meter from the tripler's clipper diode connection to chassis. There was a positive reading for a few seconds, then a negative swing as the set went off, returning to positive although the set remained off. I disconnected the diode lead from the panel and the set stayed on. So I accused the first anode supply reservoir capacitor 5C16 of being intermittently open-circuit. A replacement proved that this was not the case.

Look at the transformer. The yoke was the original, so only the overwinding had been replaced. I then accused the third harmonic tuning coil 5L3 (on the transformer) of causing the trouble. Remembering the scan panel I'd removed from a T20 on Saturday, I took the transformer off this and tried it in Eric's set. The picture appeared, with serrated edges, then the set went off as before. I put my head in my hands and hoped that the muddle would clear.

The new winding I'd fitted on Saturday was in fact faulty. So I took Eric's transformer and fitted it to the Saturday panel. Lovely. The picture remained, proving that 5L3 wasn't at fault, also that the fault was still on Eric's panel. More urgent work then came in, so the T20 was put to one side.

## Touch Tune

Thankfully I turned to something else. A touch-tune GEC colour set – C2113 type. The complaint was that the end neon (no. 6) was alight and couldn't be changed. Cleaning the touch pad thoroughly made no difference so I pondered on whether to attack the touch panel first or change the ETTR6016 channel selector i.c. With bleary eyes I pulled out the drawer containing ETT6016s. The one in the set was of the quill type but this didn't ring a bell in my muddled mind. I took it out and fitted a quill-to-dil

holder to facilitate any further change that might be necessary (fool). In went the replacement. The neons fluttered but channels one and three could be selected and tuned. Channel two could be tuned but the neon didn't light. The other three would give only one channel which couldn't be altered and I then noticed that the channel six tuning potentiometer was missing. I wondered how position six could produce a channel without a tuning potentiometer being fitted and became even more confused. What right had a moron like I to undertake the repair of such complicated equipment? But I don't ask for it. I don't advertise at all, keeping as quiet as I can hoping that no one will ask me to do anything. Lazy I suppose. But very muddled and getting more so as time goes by. Someone said my brain cells are dying at the rate of knots, and I think that's right.

I've tried yoga, but every time I got into a thinking position someone would come in and ask me to do something for them. Yes now, where was I? Funny neons. I tried another chip in the holder and this did different things. I did earth myself before handling them, honest. So I took out the touch panel and found a spring missing from position six. I wondered about this, and took out the other number six spring to see if it made any difference. Neon two was black, so I replaced this and then put the lot back in. Neons four and five fluttered all the time but channels one, two and three could be selected. Positions four and five gave channel one and couldn't be altered.

A couple more sets came in and were done and taken away in minutes. But I had the GEC and the T20 nagging away at the back of my mind all the time. I was getting more fed up by the minute. Then the phone rang.

"Hallo Les, have you a pnp transistor rated at 100V or more at 10A – ring us back if you can find one on your untidy shelves." I found one and rang back. "Found what you want. Do you happen to have a spare T20 line output panel you can lend me?"

"Certainly Les" was the surprising answer. And it was there in minutes. They must have needed that transistor real bad. Not true – they always help. I returned to the GEC set. Looked at the circuit hard. Looked at the i.c. ETTR... I'd been trying ETTs. I looked here and there and eventually found an ETTR, but its legs had seen solder before and they were quill of course.

They were dil in seconds. This produced number one neon lighting but nothing else. A bell rang and I knew I'd put a suspect on the shelf instead of dumping it. At this point the owner returned. I explained what had been happening and to my surprise he didn't turn a hair.

"Oh yes. Knew about the front panel. Had it out the other night. Don't worry about the ETTR, I can soon stick another of those in. As long as you've confirmed what I thought. I'll put it right, don't worry."

I put the back on so quickly the displaced air nearly knocked him over. "Cheers. Goodbye. Have a good day." I'd spent a lot of time and worry, mainly of my own making. Send in the clowns... don't bother, they're here.

## Back to T20s

Back to the T20, and I couldn't remember how far I'd got. Oh yes, I now had Eric's panel with a fault on it I couldn't fathom out, my panel which only needed a new line output transformer, and a spare panel which had been brought in a couple of hours previously. I put the spare panel in Eric's set and it worked splendidly. I phoned Eric and told him to come and get it, feeling a bit sorry that his

panel with the new transformer and tripler etc. wasn't in it. I then fitted Eric's transformer to my panel, which worked beautifully. So my T20 was back in action. I looked at the panel I had left over and put it on one side for now... Why have a nervous breakdown if you don't have to?

There followed a brief encounter with yet another T20. This time with a queer power supply fault that was overcome only by replacing the chopper transistor, the  $8.2\Omega$  resistor in the crowbar circuit, the two thyristors and a zener diode – plus fuses of course. I don't like this job...

# Long-distance Television

**Roger Bunney**

October was another active month for Sporadic E and tropospheric propagation. Unusually, there was a very good SpE opening towards the end of the month, with smaller openings throughout the rest of the month. Prolonged high pressure gave greatly enhanced tropospheric reception during the third and fourth weeks, from Band I through to u.h.f. The SpE log, compiled from reports from different parts of the UK, is as follows:

- 7/10/83 RAI (Italy) ch. IA. Zimbabwe (ZTV) ch. E2 was received via TE at sunset: the same opening in the reverse direction gave Spain (RTVE) in S. Africa.
- 11/10/83 TVP (Poland) R1.
- 13/10/83 NRK (Norway) E2; TVP R1.
- 14/10/83 RTVE E2, 3, 4; RTP (Portugal) E2, 3; CST (Czechoslovakia) R1; RAI IA, B. ZTV ch. E2 via TE.
- 15/10/83 CST R1; TSS (USSR) R1; RTVE E2.
- 17/10/83 NRK E2 (via Aurora); JRT (Yugoslavia) E3, 4.
- 18/10/83 RAI IA, B; NRK E2; JRT E3, 4; RTVE E2; ZTV E2 via TE.
- 19/10/83 RTVE E2, 3.
- 21/10/83 MTV (Hungary) R1.
- 22/10/83 NRK E2.
- 24/10/83 RTVE E2, 3, 4; RTP E2, 3; RAI IA, B; CST R1.
- 28/10/83 A good SpE opening with TVR (Rumania) R2; MTV R1, 2; TVP R1, 2; CST R1, 2; TSS R1, 2; ARD (West Germany) E2; RAI IA, B; JRT E3; ORF (Austria) E2a, 3, 4; +PTT/SRG (Switzerland) E2, 3.
- 29/10/83 CST R1; RAI IA, B.
- 30/10/83 TSS R1; RTVE E2, 3.
- 31/10/83 ORF E2a; RTVE E3; RAI IA, B.
- 2/11/83 RAI IA, B; JRT E3; RTVE E3, 4; MTV R1. Unidentified ch. R1 and 2 programmes during the morning.

Auroral activity was noted on the 14th and 17th. A high-pressure system started to form around the 16/17th, resulting in improved tropospheric reception on the 18/19th, mainly from the west (RTE-Eire), extending to W./E. Germany from the 19th on. Cyril Willis received BR Grunten (S.W. Germany) ch. E2 during the afternoon of the 18th, a most unusual catch. There appeared to be two main phases to this lift, during the 19th-23rd and the 25-27th. The former gave reception over a N.W./S.E. path to start with, gradually changing to include the south by the 21st. W./E. Germany, Denmark, Belgium and Holland were received in the southern UK, at v.h.f. and u.h.f. The

bands were not jammed however, giving time to seek signals on particular channels.

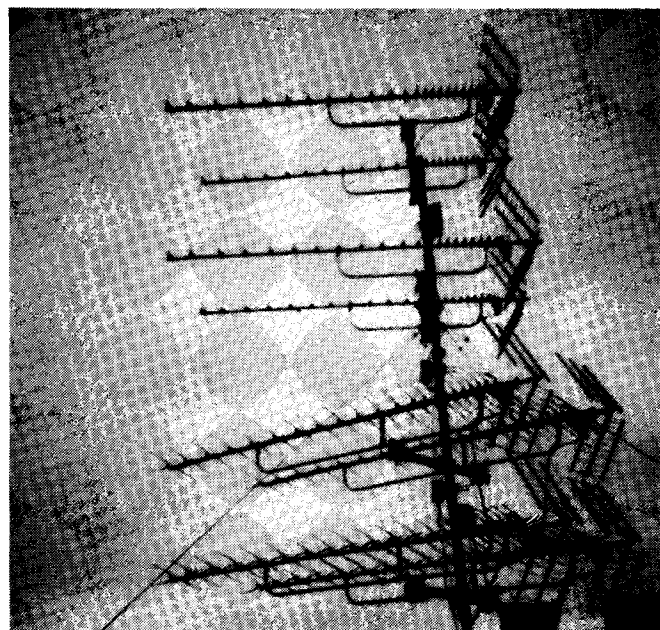
Simon Hamer (Powys) did very well, in particular with DFF (GDR) ch. E34 and Liège (Belgium) ch. E3 on the 22nd. Many enthusiasts reported reception of E. Germany and Denmark (Band III). The French ch. 9 (formerly ch. 6) was seen over a wide area, with Antiope and test signals, but more interesting was a signal at the l.f. end of Band III (just h.f. of ch. E6) with scrambled TDF/TF1 programme material from the direction of Paris. The picture locks solidly enough but the lines are shifted with respect to each other by several microseconds, giving the impression of a line sync fault. There are also two white bars from right to left and other cogging effects – not a pretty sight. A photograph shows the test card received at Romsey. The scrambling tests are presumably in preparation for the Canal Plus service.

October 23rd produced many Polish transmitters during 0600-0830 GMT in Holland. RTL (Luxembourg) was seen using dual-sound transmissions on ch. E7 – the sound signals were either French/German or German stereo TV sound.

Another slight lift on November 1st gave Robin Crossley (Potters Bar) Switzerland ch. E22 (Chasseral, 12kW e.r.p.).

The above openings gave many enthusiasts their first sightings of ATV transmissions. Simon Hamer logged G4IMO (Nick Harrold, Essex) at strength P4 (almost noise free).

My thanks to the following for their reports: Simon Hamer (Powys), Hugh Cocks (E. Sussex), Cyril Willis (Ely), Iain Menzies (Aberdeen), Robin Crossley (Potters Bar), D. Moller (Eastbourne), Tim Anderson (Stroud),



Michael Rahe's aerial installation at Tramore, Waterford, Eire. The upper quad stack of group B Triax aerals is for reception from Presley, Wales, the lower group A stack for reception from Caradon Hill. For much of the time reception is good using a 25dB gain, 1.4dB noise figure amplifier.

# Songs My Grandad Taught Me

*Les Lawry-Johns*

My memory for day-to-day things gets worse and worse. "That set of mine you repaired yesterday. There's just one little thing . . ." I can't remember doing their set or what was wrong with it, and unless I look it up in the book I just have to stand there for a while until the memory comes flooding back. "Here's the fiver I owe you for the job you did for me last week." "Oh, yes. Thank you very much." I'd completely forgotten. What would I do without H.B. to remind me about such things? So it's not really that I forget, it's just that the recall chip doesn't function until jogged. Probably a dry-joint somewhere.

I can remember my earliest years however. I can remember laying in a cot, watching the family eat and crying for some. Then my mother saying "look at him thinking he can eat our food". Also being pushed in a pram by my grandmother who told me she'd take me to the police station if I cried. But most of all I recall my grandad playing his concertina and singing his songs about the Crimea and the Balacava Charge (the Light Brigade).

Mind you it wasn't all honey. Oh no. I was once supposed to be asleep when my grandparents were engaged in running Aunt Lil down into the ground. Half way through the tirade I woke up. My grandad noticed and immediately accused me of spying - "I'll cut his liver out" he bawled, reaching for one of his many walking sticks (the one with the dagger at the end). Grandma tried to cool him down. "Yes" he said, "I was only agreeing with you like I always do. Didn't say a word against her. I'll be glad to get back on board again, I swear I will."

"Play us a tune before you go" I asked. So out came the concertina and Grandma vanished into the kitchen to put the stew pot on. She made lovely stew, with dumplings. Mum couldn't quite get the same taste. Grandad started with a swinging rendition of The Bells, followed by a funny song I never really understood.

"I went into the butcher's and stole a leg of suet,  
Singing bullyah, bullyah bay.  
I stuck it in me boot and didn't mean to do it,  
Singing bullyah, bullyah bay."

I clapped that then asked for my favourite.

"Bayonets charging bombs and mortar,  
Dying groans from every quarter,  
Down the Valley of Death the gallant charge was made,  
By the lion hearted heroes of the Light Brigade."

There was a lot more to it, something about the artillery thundered and someone had blundered, but I can't quite put it into context. Even for this my memory's not what it was.

I can still remember the first article I wrote for the magazine some thirty years ago however. About the HMV 1807 (I think). I followed this with one on the 1805 and earlier models. There's a resistor that goes high in the, let's see now, which circuit was it?

Some years later I met Johnny Logan, the one-armed engineer. Quite a character - happy to handle large sets and run over roofs putting aerials up. He gave me many a hint, like smearing custard over the centre spindle of BSR

record decks to prevent them running rough. Only kidding. He told me how to handle women, and shortly after I got divorced. He's up north now. Stay there John, I've been happy for twenty years or so now. H.B. says that if you phone us at 11 p.m. any more she'll smear custard on your centre spindle . . .

## **The Pye 725**

A friend (was) of mine brought in this Ekco CT822/1 - the Pye chassis with the vertical panels. The complaint was that the colour went on channel change or on sudden bright scenes. So I brought the hairdryer into play and when it was directed at the TBA540 the colour went.

"No bother Mr. Lupton" I said, changing the chip. The colour then stayed - until next day.

I checked this, that and the other, finally ending up at the TBA540 again. I put in another and the colour stayed for two days.

"It goes grainy as well now" said Mr. Lupton.

So I took out the i.f. gain/filter unit and resoldered all the suspect contacts.

The next day it was back. "Colour's gone again." He looked sort of tense, but only when he tried to smile.

This time the TBA540 said it wasn't guilty, but when the freezer was applied to the TBA560 the colour went off. In went another and we kept the set on test for a couple of days. Lovely. Three days later it was back again.

"It's gone grainy again." To cut a long story short, I changed the i.f. gain/filter unit and the tuner. And still it came back. Trying to see through the tears, I removed the filter unit and resoldered all the suspects as usual. The dry-joint was on the coupling capacitor C117, not on a coil as I'd thought. So far it's not come back, and Mr. Lupton did manage a smile as he went out with it. Funny how sets you know so well can give you so much heartache. Funny how quickly you forget it when the next one comes along.

## **The Quad**

A couple of weeks ago this chappie brought in a Quad amplifier. The little stereo solid-state one with 2N3055 output transistors and vertical plug-in audio panels. He said it worked for a short time then cut out. It worked for me all day, so I told him to check the rest of his set-up. "You mean the tuner?" he asked. He didn't use a record turntable or tape deck.

So he brought in the tuner, which was also a Quad. This time with valves in it. Sticking a signal tracer on the output, I found that it worked perfectly for some fifteen seconds then cut out, leaving a trace of background noise. There were a couple of 6BA6 i.f. bottles, a couple of 6AL5s, a 12AT7 (there should be two) and an ECC81 (equivalent) in the other 12AT7 position. I wondered where to start, then decided that I didn't have much choice - I could lay my hands on the 6AL5s (EB91s) but didn't suspect them, and wasn't keen on searching for 6BA6s because I was sure the last went years ago. So I looked hard at the ECC81. I felt sure I had one somewhere (out of an old VC3?) but I couldn't be sure where. I

knew that an ECC83 isn't far out and had plenty of these – for amplifiers and things. So I fitted one and the radio stayed on.

He said it sounded a little distorted (as it would through a signal tracer, for heaven's sake). So I stuck in an ECC82. He said it sounded better, daft bugger. The customer is always right however (never) and off he went quite happily. In fact an ECC82 was the same as fitting a 12AU7 in place of a 12AT7, way out. But he was convinced it sounded better.

### ***The Table Lighter***

There were two sets on the bench. One had to be close at hand because it was on soak test and when things did happen they happened suddenly and horrifically. The other was a routine selector change (round for square) on a CVC9. In walked a tiny old lady of about eighty five. She plonked a coffee percolator and a table cigarette lighter in front of me.

"I want a yard of cable put on this, and a different screw put in the bottom of this because the proper screws won't go in."

I started to let rip and then shut up. There was

something about the old girl I liked. I tipped out a tub of small screws and found one that fitted the thread. She took it from me, pushed a flint up against the spring inside and tried to fit the screw. It slipped, and the flint shot out across the shop to heaven knows where. "Now look what you've done" she scolded.

I opened a draw and found one of my own flints. Took the lighter and pushed the flint up inside. Held the screw and tightened it. Flick the top. No flick. Of course not, the spring instead of the flint was hard up against the wheel. I unscrewed it and the flint flew into the CVC9. After a time I found it and removed the spring from the lighter. When correctly assembled the original screw fitted nicely and the lighter worked. She took it without saying a word and put it into her bag. "Just a yard of cable fitted to this plug and a mains plug at the other end." By this time other customers had arrived to consult the oracle and were smiling broadly at the antics.

"Pop back later dear. I'll fit the cable as soon as I get a chance."

"All right then. No one wants to work these days. I'll give you an hour, no more."

And off she went. A small figure with enormous presence.

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## ***The Case of the Curious Cossor***

***Chas E. Miller***

As with so many once famous names in the domestic radio/TV field, that of A.C. Cossor is now a distant memory. Yet at one time it was a market leader, with radio and TV sets and the valves to go in them. Cossor were pioneers in the use of printed circuits and were one of the first firms to introduce a transistor portable radio receiver. The firm was started in the twenties as a valve manufacturer, but soon moved into the radio receiver field as well. Older readers will doubtless recall their famous kits which were sold under the Melody Maker name. Throughout the thirties the firm also produced ready made receivers. These were of generally rugged construction, but relied on t.r.f. circuitry long after most other makers had virtually abandoned it. Cossor called their t.r.f. sets Super-Ferrodynes, which no doubt sounded good in the advertisements. They also made some pieces of test equipment that were quite sophisticated by the standards of the day: the present writer still has and uses a 1937 wobulator which, so far as I know, has had but one capacitor replaced and retains the original valves.

Just before and during the second world war Cossor were involved in the production of radar equipment. At the end of hostilities domestic radio receivers reappeared, to be followed shortly after by a series of television sets. The example we're going to examine, the 901, was really a pre-war design. It illustrates perfectly the "sledge-hammer to crack a walnut" approach that characterised so many of the sets of the late thirties through to the early fifties, employing as it did a total of 28 valves, three of which were used for ordinary radio reception, and a Cossor 85K c.r.t. The tube was of interest in being one of the first to be fitted with an ion trap magnet (Cossor patented). Apart from that it was a round, 15in. type with a triode gun and a four-clip base. The use of an ion trap became the normal practice, to avoid ion burn of the phosphor screen, in the days before aluminized screens.

The vision and sound receiver sections were completely separate, each having its own input socket. These were fed by a splitting arrangement built into the main aerial panel, which also incorporated a simple attenuator for use in areas of high signal strength.

True to their belief in t.r.f. circuits, Cossor chose this type of vision receiver. It employed no fewer than four r.f. amplifiers. These used 63SPT pentodes, the Cossor equivalent of the more famous (notorious?) Mullard EF50. Detection was carried out by a single thermionic diode, type SD6, which was peculiar to Cossor. It had the B7G "button" base. Four more of these valves were used as sound and vision interference limiters and for line and field sync separation. Fig. 1 shows the video circuitry.

The video amplifier stage used another Cossor special, the 61SPT. It was a powerful, octal-based r.f. pentode capable of several watts anode dissipation. Note the overall low value of the anode load resistance. This valve had what must have been the most expensive screen grid feed resistor ever – a 6V6G beam tetrode which was used as a constant-current source. The video signal was d.c. coupled from the anode of the 61SPT to the c.r.t.'s grid, and the tube's cathode was connected to one side of the heater supply. Thus the latter, which was also common to the vision interference limiter and sync separator diodes, had to be maintained at well above chassis potential to provide the necessary tube bias. In fact with the brightness control set to minimum the heaters were at 390V, which probably gave more than one engineer a nasty little shock! A similar idea was used for the sound interference limiter diode, which had one side of its own special heater supply connected to the sound unit's h.t. line.

If these points suggest that the power supply was somewhat out of the ordinary, you're right! There were no fewer than eight heater supply windings on the power pack's three mains transformers. In addition to the oddi-

# The Card Game is Over

Les Lawry-Johns

Some time back I mentioned the card game we played at the Call Girl at lunchtime on Sunday. Honey Bunch's partner was Sean (John). For a long time Sean suffered from a bad heart and a damaged leg. Recently his leg got much worse and he was taken to hospital. He was found to have lung trouble and didn't survive long after an operation. H.B. took it upon herself to arrange the burial and all the other things that have to be done when there are no relatives to handle them. It's now over and done with, but we are left puzzled by the vacuum that Sean left behind him. No papers, no letters, nothing. He didn't talk much, and when he did he talked so softly that few heard all he said. We know that he had been resident in the Waterford or Wexford area and that he had served in the police force there for some ten years. We also know that the magazine has a number of readers in that area. He spoke of his father, brother and dog. Perhaps someone there knows a little more about John Joseph O'Leary? If so, we should like to hear from them. He was well known and liked here.

## Testing Ultrasonic Handsets

Someone brought in a remote control handset that wasn't working. I checked it over, resoldered several suspect joints and fitted a new battery. I then realised that I didn't have a suitable set to check it on. All our new sets have infra-red remote control. The cat (Spock) was asleep on top of one of these sets. I pointed the unit at her and pushed the button. Her ears flicked. I waited a while then tried again, with the same result. This world shaking scientific test was carried out several times. We wrote: handset repaired and subjected to repeated tests on suitable receiver.

## The Philips G11

The G11 can be a bit of a pain at times. One pained me the other day. A white line across the screen testified that all was not well with the field timebase circuit or the supply to it. Normally the TDA2600 field timebase chip goes short-circuit internally and blows the 800mA fuse on the line output panel. So, finding the fuse blown, I removed the heatsink on the TDA2600 and fitted a new chip. I then checked for shorts and fitted a new fuse. Switch on and pop goes the fuse.

I checked again for shorts. None. So I removed the chip, replaced the fuse and tried again without fitting a TDA2600. The fuse held. Fit another TDA2600. Pop. Conclusion: the i.c. was in order, the short occurring only when it came into operation. I looked at the circuit diagram and tried this, that and the other. It took this idiot some time to find that one of the two parallel-connected 1,000 $\mu$ F output coupling electrolytics was dead short. I should have found it in the first place.

## Miss Spray

Miss Spray came in to tell me that her Pye 725 was playing up – the colours were constantly changing. We immediately diagnosed a faulty RGB output stage thick-

film resistor unit, and this proved to be correct. However... She had these two little dogs with her and they immediately caught the smell of Ben. They then tried to cover every vestige of such smell as best they could. After telling me her tale of woe she noticed what was going on. "You naughty boys" she snapped, "sorry Lorry".

I smiled weakly. Thank heavens they were small dogs. It took me about an hour to remove all traces of their visit.

## Mrs Plunky's G8

Mrs Plunky phoned to say that her Philips TV (G8) had suddenly lost height. As she was on her own she couldn't bring it in. Not wishing to be away too long, I grabbed a G8 timebase panel and the rest of the boxes and sped to her house. I took in only the toolbox and the panel. She showed me the picture, and although the height was indeed lacking there was also a nasty curve inwards at the right-hand side. I decided against the panel and nipped out for the spares box. Removing the rear cover, I held a mirror to the front of the h.t. reservoir capacitor: there was severe deterioration, so out it came. Unfortunately I'd forgotten to put a 600 $\mu$ F, 300V electrolytic in the box. I'd several of the 470 $\mu$ F type for the G11 and one 200+300 $\mu$ F 350V electrolytic can (Pye hybrid type). The latter was too long to fit in the original position, but it stood up nicely and the clip could be fitted to keep it there. The two positive tags were moved together, soldered to the red lead, then black to the negative tag and all was well. A nice picture with full height and width.

"Who's a clever boy then?" I squawked. "Who's the best boy in the world?" Unknown to me however Mrs Plunky had returned and was standing behind me. She was giving me an odd look.

"Do you always sound like a parrot?" she queried.

"Er, well. It's not so much a matter of parrots. My wife is trying to teach this young cockatiel to speak and it's sort of catching."

"She seems to be teaching it to be rather conceited" sniffed Mrs Plunky. "Do I owe you anything for this quick little job?"

Oh dear. No one seems to appreciate me any longer.

## Round the Room Four Times

We get our share of strange tales. This young couple struggled in with their Ferguson 9600. The young man started the tale, which was eagerly taken up by the girl.

"The set goes all right for some time and then the picture goes funny" said he. "And we have to unplug it, wheel it round the room four times, then it's all right for the rest of the evening" said she. I looked at the set for some time, then asked the key question. "Clockwise or anticlockwise?"

She was struck dumb for once. "Clockwise" said he after a pause.

I turned the set up and, with the rear cover off, looked for a dry-joint under the centre section. "It curves in at the sides" he said helpfully. So I concentrated on the EW correction circuit and found one of the modulator diodes loose in its solder at one end. A quick dab of the iron with



the help of some fresh solder completed the job. When the set was turned the right way up the picture was slightly impure at one side – well, would you like being stood on end?

“Now listen” I said, with as straight a face as I could manage. “When you get back, wheel the set around the room four times anticlockwise. To unwind it, see?”

The girl nodded. The young man got the message but went along with the leg-pull. “Magnetism of the earth” he said.

“Exactly, and good luck to you both.”

“When are you going to repair the set?” asked the girl.

“Already done dear. It had a cold and needed warming up . . .”

# DX Signal Detector/Alarm

**G.R. Exeter**

The circuit described in this article is capable of detecting very weak TV signals and providing an audible indication that a signal is present. It was developed primarily for use with rapidly changing sporadic E propagation. The basic idea is shown in Fig. 1. The video signal itself is used to provide the sound, giving an immediate indication of signal-to-noise ratio and interference. The filter section detects the 15,625Hz line frequency component of the signal, producing a switching voltage to control the video feed to the audio amplifier. In use, the channel being monitored must initially be clear of 625-line signals – the presence of some 405-line information will not upset the circuit's operation. Two phase-locked loops are arranged as a narrow-band filter to generate the switching voltage. System M, 525-line signals (line frequency 15,750Hz) are also detected.

## Circuit Description

Fig. 2 shows the circuit. For the phase-locked loops, two TDA2591 (alternatives TDA2590 or TDA2593) i.c.s are used. These are fairly complex i.c.s intended for use as the sync separator and line generator sections of a TV receiver. Not all the internal circuitry is used. The sections that are used are shown in block diagram form in Fig. 3. These are the sync separator, oscillator and phase detector, i.e. the phase-locked loop, the coincidence detector whose output varies the gating of one input to the phase detector, and the pulse generator and output stages. Use is also made of the fact that the voltage at pin 4 can be employed to switch off the output at pin 3, while the burst gating/blanking pulse output at pin 7 is used for setting up.

It might at first sight appear that the output from the coincidence detector, at pin 11, could be used to indicate the presence of a signal without any further complication. The output here is similar whether the input consists of noise or a strong locked signal however. Instead, the two TDA2591s are run with slight frequency offsets: when a signal is present, an output is obtained once both circuits have locked in. The principle is shown in Fig. 4.

A negative-going video input should be used, though reduced performance will still be obtained with a positive-going input. The video input is first filtered by R1 and C1 to reduce the noise bandwidth. As there's no need to worry about picture cogging, more filtering than usual is

employed. This filtering also means that there's no need to make use of the noise-cancelling circuits within the i.c.s. The video signal is then buffered by Tr1 and fed via C2 and C8 to the sync separators in the i.c.s and via R23 and C16 to a convenient input for the TBA120S i.c.

The external oscillator capacitors are connected to pin 14 of the two TDA2591 i.c.s while pin 15 is used to set the frequency. High quality components should be used here in the interests of long-term frequency stability. The phase detector output at pin 13 is filtered and fed back to pin 15.

The output obtained at pin 3 of IC1 is applied to pin 4 of IC2 so that the latter produces an output only when pin

## Components List

### Resistors:

R1	1k
R2	4k7
R3	1M8
R4	1k2
R5	82k
R6	12k
R7	100k
R8	2k7
R9	2k7
R10	10Ω
R11	1M8
R12	1k2
R13	82k
R14	12k
R15	100k
R16	10Ω
R17	1k
R18	10k
R19	2k2
R20	100Ω
R21	1k2
R22	820Ω
R23	100k
R24	10k
R25	100k
R26	10Ω
R27	10Ω

All ½W, 5%

### Capacitors:

C1	1n5	ceramic
C2	0.47	polyester
C3	0.1	polyester
C4	4.7	63V axial electro.
C5	10n	polyester
C6	4n7	polystyrene
C7	47	25V axial electro.
C8	0.47	polyester
C9	0.1	polyester
C10	4.7	63V axial electro.
C11	10n	polyester
C12	4n7	polystyrene
C13	47	25V axial electro.
C14	47	10V axial electro.
C15	47	25V axial electro.
C16	0.1	polyester
C17	1	63V axial electro.
C18	0.1	polyester
C19	1n	ceramic
C20	100	25V axial electro.
C21	0.1	polyester
C22	47	25V axial electro.

### Miscellaneous:

D1	1N4148
Tr1, 2	BC252B or equivalent
IC1, 2	TDA2591
IC3	TBA120S
IC4	LM380
RV1, 2	47k sub. min. horizontal preset
RV3	10k 15mm min. PCB mounting
Small speaker	

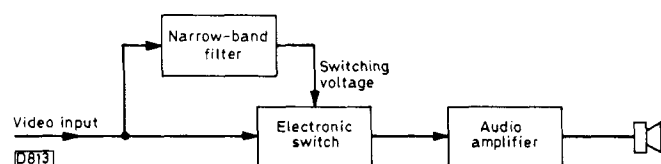


Fig. 1: Principle of the DX signal detector/alarm.



areas of the country will never be served by cable, due to the sparse or scattered population.

The BBC would in this event hope to raise its licence revenue so that it could fight back, but what of ITV? Already saddled with the burden of financing Channel 4, faced with the growth of VCR use, and anxious to maintain viewing figures so as to sustain advertising revenue, the independent companies could find themselves very hard pressed. For the BBC and the IBA, either

separately or jointly, to finance a superfluous DBS service is in these circumstances as appropriate as a bankrupt third-world nation operating its own prestige air line. High technology is all very well, but not for its own sake. The BBC and the IBA have virtually complete coverage with their present transmitter network: they should swallow their pride and forget about DBS services.

*Chas E. Miller,  
Woodseaves, Staffs.*

# This Little Ting Here

**Les Lawry-Johns**

I suppose we all get a trifle confused over the various Bush models and chassis, and it's not till we take a closer look that our spirits rise or fall. So when these two rather elderly men puffed into the shop carrying a 22in. Bush colour set I immediately thought it was a late 823 chassis.

"There's a white line across the screen" said the tall one.

"No it isn't, it's a red line" said the short one.

"Fret not" I assured them, "'twill be put right in a trice."

## The Bush Z718

I whipped the back off and my spirits fell. Seeing the swing down panel across the rear section I thought it was a T20. Then I saw the two line output transistors on the right-hand side and realised it was a Z718. My spirits fell further.

"Umm, it won't be put right in a trice."

"Don't worry. We've all the time in the world" said the tall one.

"Sure it's only a little ting" said the short one.

"That's because you don't have to find the little ting" I growled.

"Oh you'll find it in no time at all" he continued. "We'll just have a cigarette while you're doing it. Just carry on John."

Honey Bunch smiled and chatted to them about the weather while I delved into the field timebase. The transistors appeared to read right on a cold check, except for one of the output transistors, VT7. It gave a low reading from collector to emitter, the same on reversing the prods. Out came VT7, off its heatsink. In went a new 16905. Switch on and we had a nice, full-sized raster.

"There" said the short one, "didn't I tell you it was just a little ting you'd find in no time at all?"

I growled to myself something about what would happen to his little ting if he wasn't careful, then plugged in the aerial. No signals, just noise. None of the touch sensors were alight, so I touched the first one and dropped down the flap to tune it in. Wind the red pointer up and down but there was nothing except for a few flutters to reward my efforts. I then touched sensor two and with slight adjustment BBC-2 showed a news sheet. I felt better. Touch sensor three and the news sheet remained, even when I ran the number three red pointer up and down. It was still there in positions four and five, even though the pointers were in different positions. Position six could be tuned and I ran it up to BBC-1. Select sensor

two and BBC-1 is still present.

"You didn't tell me this lot was up the creek" I moaned.

"It's not up the creek" said the short one, "it's just a little ting here."

Whilst I was trying to read the tuner voltages on the connecting plug, looking for the tuning voltage in particular, he was spinning the little wheels and thus making me angry.

"See John, you have to get all these little pointers on the same line. Then they work."

I was fast loosing my cool.

"All right then, if that's all there is to it you can take the set away now."

"No need to get upset over such a little ting."

The tall one saw how the wind was blowing and intervened.

"Leave it to Mr. Johns, Paddy. It's not working right and he'll sort it out if we leave him alone."

"Yes, leave it to him to tink out."

I chose my words carefully. "That's what I'm here for, tinkling tings out all day long".

Honey Bunch fled to the kitchen. I heard her talking to Ben. "He's out there tinkling. He'll need a bath tonight or he'll be tinkling tomorrow too." It didn't help. My logic, fragile at the best of times, had gone.

I removed the three nuts and took out the touch tuner panel, then accused the ETT6016 of bugging about. I took it out, having earthed myself to the live mains, and sustained a bleeding hand. "Calm down now. Try to think logically like ET does."

That little brass image still looks down at me, his finger pointing. Always pointing. Saying "you're not doing it right Les. Get the voltages right." But I didn't listen. I fitted another ETT6016 and what do you know - the neons started to work. They lit up when touched, and I was sure I was there. I wasn't.

Although they lit when touched, only six was tunable - and tuned the other five for God's sake.

Shorty moved in again. "It's this little ting here", pointing to the a.f.c. button. Out he moved, and ET's finger continued to point at me.

I checked the voltages against those given in the circuit. There should have been 188V at 9R39 on the touch tuning panel (Fig. 1). The reading was more like 30V - I'd previously taken this to be the tuning line, but it wasn't, it

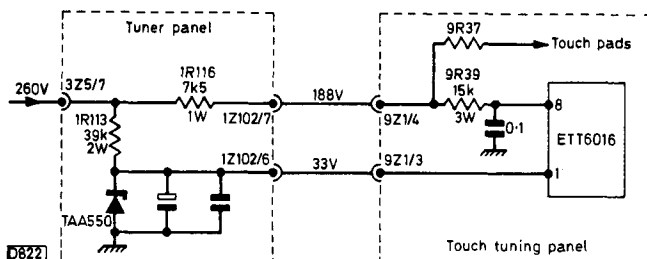


Fig. 1: Supplies to the touch tuning panel.

was the supply to the ETT6016. I traced the line back to the tuner panel, where I promptly got confused between 1R113 and 1R116. Like a fool I first accused 1R113, but it was 1R116 that was open-circuit of course. Replacing it restored normal channel selection and tuning.

Shorty looked at the faulty resistor. "Just a little ting..."

Having disposed of the comedy duo, we can consider the circuit briefly. 1R116 takes 260V at one end and drops 72V, providing a 188V supply at the other end for 9R37 and 9R39, the latter feeding the ETT6016. Hence the crazy behaviour when this supply is absent. I should have gone straight to it. Like you would, but I don't tink like you.

## Sparko's Return

I was just settling down for five minutes' read of the magazine when the door crashed open and in fell Mr. Sparks. Till that moment he'd been carrying his Thorn 8500. "Nice of you to drop in" we greeted him.

"Get this bloody set off my foot, Len" he bawled.

First it's John from Paddy, now it's Len from Sparko. What it is to be well known.

So I lifted the set off his foot and he hopped around like a wounded kangaroo.

"Why do I have to bring this bloody thing to you each time? Why can't you call out like civilised people do?"

"Because I'm too lazy and don't want to work too hard, that's why. Now what do you want me to do for you?"

"Just fix it for me Len. I don't care how much it costs as long as it's not more than a fiver."

I ignored that because Sparko never argues about the

bill. Mind you he does like to stop and watch and murmur every now and again "thank gawd it's not me with my hand in there."

So we took the back off, plugged the set in, and switched on. A blurred picture with no sound appeared. We switched off and checked the speaker, which was o.k. We then removed the power panel which, as you know, is where the MJE340 audio output transistor VT701 lives. It had base-emitter leakage, so out it came. I looked in my little drawer marked MJE340 and took one out. It was of entirely different construction, and I stared at it in disbelief. The one from the set was of the TO126 type, like the BD131. The one in my hand was of the TO220 type. The base and emitter leads were reversed, so it had to go in on the reverse side of the heatsink to get the connections right. When fitted, the sound was loud and clear, so the voltage rating was right. Later investigation proved that the transistors in the drawer should have been marked MJE340K (30W rating). Ho hum.

The blurred picture didn't respond to adjustment of the focus control, so the e.h.t. rectifier unit came under suspicion (the built in resistor goes high in value). Smiling at Mr. Sparks, we removed the suspect unit and fitted a new one. The focus was now good and the sound loud and clear. "Did you say a fiver Sparko?"

"Just joking Len."

## Hallo Stan!

Hardly had Sparko left than Mr. Murray walked in. He's been coming in for seventeen years.

"Hallo Stan, how's your luck?"

"My name's Hilda Mr. Murray..."

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usually result in power supply tripping and eventual failure of the BU208 line output transistor.

### Control Panels

Operation of the on/off switch over a period of time in sets fitted with control panels CMC50/54/63/67, i.e. some versions of the CVC25/30/32 chassis, can result in stressed solder joints at the junction of the switch connections and the copper pads on the board. Sets where the switch is soldered directly to the panel without any other form of

mechanical support should be carefully checked when serviced. If damage to the copper or base material has occurred, it's best to hard wire the four unused connections on top of the switch to the appropriate copper pad farthest from the switch on the underside of the board, using 16/0.2mm wire with insulation thickness of at least 0.5mm. Two brown and two blue insulated leads approximately 12cm long will be required. The problem does not arise with later sets that have additional mechanical support for the on/off switch.

# What's Up Doc?

**Les Lawry-Johns**

We get so used to our own ways of going about things – diagnosing troubles in errant TV sets, putting things right after a preliminary examination or not putting them right after jumping to a wrong conclusion – that I thought my recent experiences of another sort might make an interesting comparison.

### The Swelling

Over a year ago I noticed that the right side of my stomach was larger than the left. I didn't take much notice, and the months went by. Then niggardly pains started, and so did Honey Bunch.

"You've got to get something done about it."

"Yes dear."

The pains got worse so I eventually went to the doctor, who said I'd better see a consultant. This I did.

First a nurse weighed me and measured my height.

"Aren't you tall?" she smiled.

"And good looking with it" I smiled back.

"Now take your clothes off and lie down."

The things these girls say nowadays. But I did as I was told. Next the consultant's understudy came along to ask a few questions.

"Why did you leave it so long?"

"Because I thought it would go away."

"Where does it hurt? Put your finger on the place."

"Mainly about here."

So he pressed and probed and I jumped about a bit.

Then he explored my private parts, holding my testicles.

"How many have you got?"

"How many of what?"

"What I'm holding."

To say I was put out would be to put it mildly. I'd always assumed one had two, and here was a man asking whether I'd any more.

"Just two" I said in a small voice. "How many am I supposed to have?"

"Two of course. But sometimes one gets lost inside you see."

I couldn't, so I settled back so that my mind could assume its usual blankness.

"Turn on your side" I was told briskly. As I did so I snatched a glance at what was going on. The nurse had handed the doctor a long chrome stick with a bulb at the end of it, and he was coming towards me. "Hang on" I panicked. "What are you going to do with that?"

"Examine your rectum of course. Now keep quiet and relax. It won't hurt all that much."

But it did. I never knew what heaven was. It was when he'd finished.

"There" said the nurse. "That wasn't too bad was it? Mr. X will be in to see you in a second."

I heard the consultant consulting with his assistant who described something as a trifle strange.

Mr. X came across and prodded and probed but fortunately didn't go through the whole procedure again. "Hum" he said when he'd finished his examination. "You'll have a blood test and an X-ray, then we'll see you again."

So I visited various departments and eventually went home to await instructions. H.B. wanted every detail of what had transpired. I told her most, in hushed tones.

"You poor dear. It must have been terrible, being the first time."

I never really know whether such concern is genuine or not.

### Back to Work

After a cup of coffee I started on the jobs that had come in during my absence. A Philips G8, a G11, a Bush T20 and a Pye 697. First the G8.

It was a late one with touch tuning, in a white cabinet. The 800mA h.t. fuse on the line output stage panel had failed, so we looked at the line output transformer with suspicion. It seemed to be fairly new, so we made some other checks. One of the BU105 line output transistors was short-circuit. We replaced this, connected the meter across the fuseholder, and switched on. Nothing, except a reading of a few milliamperes. So we could fit a new fuse and then proceed to find out why there was no line drive.

The driver and trigger amplifier stages were in order, so we turned the set up to find out what was happening under the line oscillator section. A nice board crack had stopped the start-up system working. After repairing this a raster appeared – a very bright one with no control. To cut a long story short, a wirewound resistor in the 12V supply was found to be dry-jointed. When this had been seen to a picture that only required converging appeared. We then had a very nice display.

### A Headache

The T20 gave us a headache. It would go for a long time before it cut out. When it did everything reverted to normal. So no fault could be found because there wasn't one.

The next time it went off we hooked a 10k $\Omega$  resistor across 4C19 to keep the line oscillator working. When it went off again we found that the line driver transistor's collector voltage was very low. We accused it of shorting intermittently and fitted a replacement, which didn't help. We then checked the voltages in the stage more carefully and changed this, that and the other. Eventually we found a burn mark on plug 4Z2 which links the timebase and line output panels. Pin 2 (black, earth lead) wasn't making good contact and this was the cause of the trouble. It's been reported in these pages before, for example by Mike Dutton in the March issue, but is one to watch out for as the results are so confusing.

### The G11

The complaint with the G11 was a horizontal white line. The field timebase supply fuse was intact and after fitting a new TDA2600 chip a full raster appeared. It collapsed to a white line when the heatsink was touched. So we fitted a new holder for the chip and all seemed to be well.

### No Picture

The complaint with the 697 was no picture. Our first move with these sets is to switch on and see what works and what doesn't. If the valves warm up we take tube base voltage readings to see whether it's a simple case of a low-emission PL802 luminance output valve. If the cathode readings are over 200V, this could well be the case. The first anodes should be at around 400V if the line output stage is working, and there should be some 100V at the grids. If the grids are at a negative voltage we dive straight for the 200 + 300 $\mu$ F main smoothing block. In this case we chose to read the green gun voltages. The cathode was high with the others normal. So we changed the PL802 and got a small green screen. Measurements were then made on the red and blue guns. Each grid was heavily negative. The main smoother was at fault after all. It seems we have to change one of these daily of late.

### Monochrome Portables

Another common fault seems to be putting in an appearance more frequently. Lots of imported monochrome portables come our way with the complaint no raster and no e.h.t. due to no line drive. In each case the small resistor feeding the collector of the line driver transistor via the transformer has been found to be open-circuit. This is a small-wattage (for safety) resistor of some 20-47 $\Omega$ . It often stands clear of the panel and has sleeved legs, but not always.

### ITT CVC30 Series

We've had a lot of CVC25/30/32s in recently. Although the faults have varied several have exhibited a common failing, field collapse. The easiest to cure cause of this is poor soldering to the metal frame earthing tags at the field output, top left centre, so this is what we look at first. If necessary we then let the main frame down and remove the small panel on top of the scan coils. Examination of this will nearly always show where overheating has taken place, and reversing the panel will show what has to be done by way of making good. One then has to decide whether to improve the plug-socket contact or wire the contacts directly.

# next month in

# TELEVISION

## ● SCOPE COMPONENT TEST UNIT

Do you make full use of your scope? – for example, for component testing? David Botto has devised a simple unit that can be used with almost any oscilloscope to test bipolar transistors, diodes, thyristors, zener diodes, capacitors and even resistors, the actual condition of the component under test being displayed on the scope's screen. The tester really proves its worth when checking semiconductor devices – the slightest leakage or fault in a transistor or diode is revealed and the test method has proved to be completely reliable: in addition, only two test connections (except for thyristors) are required. This is a useful and time saving instrument that won't stand idly on the shelf! It's easy to build, requiring only a handful of components.

## ● REPLACE AND IMPROVE!

Many otherwise sound TV chassis designs are let down by a particular panel or assembly that gives far more trouble than it should. Often there's no alternative to replacement of the unit concerned, due to the deterioration of the initial one. Fortunately improved assemblies are in many cases available from sources other than the original manufacturer. Tony Thomson on various alternative units and their availability.

## ● SYNC ADAPTOR

The Sony HV2000 video unit enables you to switch synchronously between two cameras, a colour and a monochrome one, and also provides other features. It's a good quality device considering its low price, but flexibility is limited by the unusual sync drive provided for Sony's own monochrome camera. The sync adaptor described in this feature allows the use of any camera needing horizontal and vertical drive pulses, such as the National WV421 and industrial cameras.

## ● SERVICING FEATURES

John Coombes on the Körting series 9 chassis used in the 59571, 59671 and other receivers. Also Les, VCR Clinic, TV Fault Finding and VCR Servicing.

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# What's Up Doc – 2?

Les Lawry-Johns

The indignities I suffered during the preliminary examination to find the cause of my lump and pains were described last month. I then had to await the X-ray appointment, which was twice postponed. During this time the problem got worse then started to improve. By the time I went for the X rays I was beginning to feel a bit of a fraud. On top of that I was hungry, because you're told not to eat or smoke after midnight on the previous day.

I arrived and reported. "Ah, Mr. Lawry-Jones. Will you just go through there, up there, turn right and take a seat?" So I went down there, through there and turned left, then asked someone for directions. I finally arrived where I should have been and sat down next to a man in a white robe and dressing gown. I thought he'd been cheating – there was this white mark around his mouth. A nurse then came and took me to a changing room where I had to put on just a white apron and a dressing gown. Next I had to take this drink, and realised what the white mark was. Barium meal. Made me appreciate what cathodes have to put up with.

When my turn came I went in and found all this interesting electronic gear. There was a monitor just beside the "inspection trolley", which was vertical. I was told to stand against it while the scanner was swung up against my stomach. This was followed by further indignities – why do they have to do so much pushing and shoving around? The man pushed a button and I was lowered to a horizontal position. Something was swung over and he said "don't breathe". I hadn't since the first bit, and was feeling rather puffed. Clonk went the machine and I was told to go and get dressed. I let my breath out with a gasp. "Can I breathe now?" "Of course, you fool. How did you manage to keep it up for so long?" "They call me windbag" I explained.

That bit over, the man who'd taken the pictures suddenly appeared and asked me to follow him. When we reached a secluded spot he told me he was going to talk about pain. If I was badly injured that would be ten. The dentist's drill would be five. Stubbing my toe one. Had I got the idea? What was the pain number when he pushed my stomach around?

"Zero" I said. He told me to go and I've not heard anything since. Perhaps I shouldn't have bothered.

## Return to the Ranch

There was a man waiting outside when I got back to the shop. He started off before I'd even opened the car door. "That music centre you repaired last week . . . it's gone off again." I'd put my last pair of SN76003s in it and can't get any more. What a welcome! Inside there were more people waiting to tell me their troubles. No one wanted to hear about mine. Back to normal – but not quite. There followed three days of absolute agony as the barium meal clogged my innards.

What about the music centre with the SN76003 output chips? One was open-circuit and the other dead short, same as before. I studied the SN76023 and decided to try a couple of these with modifications to the feedback. Cut the print from pin 16 to the 100 $\mu$ F capacitor and add a 100 $\Omega$

series resistor, then add a 27k $\Omega$  resistor between pins 4 and 16. It worked. But I won't be paid . . .

## The 3000

The next patient was an old Thorn 3000 that was suffering from various ailments. All but one of these responded to quick treatment. What we couldn't get was reliable line lock. It seemed that there were no feedback pulses to the flywheel line sync discriminator circuit. We checked for dry-joints, then ensured that the feedback/integrating resistor R506 was intact. After this we decided to change the line timebase panel complete, to prove that the fault was on this and not in the sync separator circuit, which is on the video panel, or the interconnections. The fault was still present with the replacement panel fitted, so we chased through the wiring loom. This was intact and a replacement video panel failed to improve matters. I just didn't believe it. The field sync was perfect, but the line sync almost unlockable.

I fiddled with this, that and the other, then looked at a 3000 that was on soak test and working perfectly. I took the line timebase panel from this and fitted it in the set on the bench, removing our "reliable" test panel. Perfect lock. I shouted at the test panel and called it a traitor. A resistance check proved that R506 was not returned to the timebase earth at the transformer end – the earth lead was off at connection C on the e.h.t. transformer (T503). Only just off, so as not to call attention to itself. When resoldered, the earth connection was complete. Refitting the panel produced solid line lock.

Back to the original panel. Again no earth return path, this time due to a fault in the transformer. Scrape away the blue jelly and find the winding leadout disconnected from C. Two panels with the same fault condition. It could happen only to us?

## A Moan

The PL802T solid-state replacements aren't what they used to be. The valves themselves are getting dearer and dearer – if you can get them at all – so we do use the T version. Of late the heater resistor section seems to keep springing open. The original versions didn't have this spring. After being let down on several occasions, we now make the spring an offer it can't refuse – we wrap a piece of wire around it prior to resoldering. Why the spring type is used beats me. Come back valves, all's forgiven.

## Jenny's Visit

Jenny came in whilst I was busy with this music centre that wouldn't come apart. She's a nice middle aged lady who lives up the road. As an ex-hospital sister, she'd been interested in my problem. A strangulated hernia she called it, and commented that it would probably turn to gangrene. As I say, a real nice lady, now here to enquire about the X ray. So I told her about the barium meal and what it did to my guts and the effects on my piles.

"Oh yes it does happen. Take it easy and I'll be around

to help."

"Clear off and leave me be" I bawled, frightened out of my life.

### **The Music Centre**

It was a Waltham music centre, and refused to be dismantled. Now when something refuses to come apart, I'm a firm believer that it knows best and doesn't have to be taken to pieces.

It's really that ET who stands above the desk and points

at me all day long. I swear he talks to me. That soft voice . . . "It doesn't have to come apart Les, just think for a moment."

Since the complaint was that the cassette section was making a funny noise (through the speakers), I decided that the record/playback switch needed exercise and cleaning. So I managed to squirt some Servisol on to the switchbank, then inserted a blank tape so that the button could be depressed a few times. Record stop, record stop, record stop. No more noise and no further action required. Thanks ET.

# **Long-distance Television**

**Roger Bunney**

From the lack of reports from other enthusiasts and the fact that my own loggings, day after day, consisted of only MS pings (and these only average) I think we can say that March 1984 was just awful. The high-pressure system that persisted over March 7-14th failed to produce any activity, due in part to the penetrating easterly winds in the south. Sunday the 18th was relatively active, with short duration SpE propagation during the morning, mainly on chs. E2/R1/E3. There was a short SpE opening on the 24th, with RTVE (Spain) present on chs. E2/3 at high levels. Colour was good, with sports programming, till lunch time. The only other notable event consisted of auroral activity on the evening of the 27th, with signal reception on chs. E2/R1/E3. Perhaps the shortest log on record . . .

I've been clearing up the interference problems associated with my ATV transmissions at 437MHz. To date, all the households affected have either used a head amplifier or been coupled to a local distribution system. Suppression indoors has usually been sufficient, using a Teldis bandstop filter that provides a 34dB rejection at 435MHz. In one case it was necessary to fit a Labgear CM9034 group-pass filter between the aerial and a masthead amplifier, due to problems with the latter. This filter provides 30dB attenuation at 435MHz. The distribution system was dealt with by adding a front-end filter (in agreement with the operators).

### **New Products**

A series of TV sound receivers has been introduced by Kingsbrook Marketing Co. Ltd. (92E Macadam Road, Earlstrees Industrial Estate, Corby, Northants NN17 2JN). In addition to a UK system I u.h.f. version there are others for v.h.f./u.h.f. reception including French TV. The receivers are aimed at the hi-fi enthusiast and have six push-button tuning (UK version anyway). The specification looks good, with features such as dynamic noise reduction. Prices range from around £100 to over £140 for a model with a built-in hi-fi amplifier. The tuner is a Mullard MOSFET type.

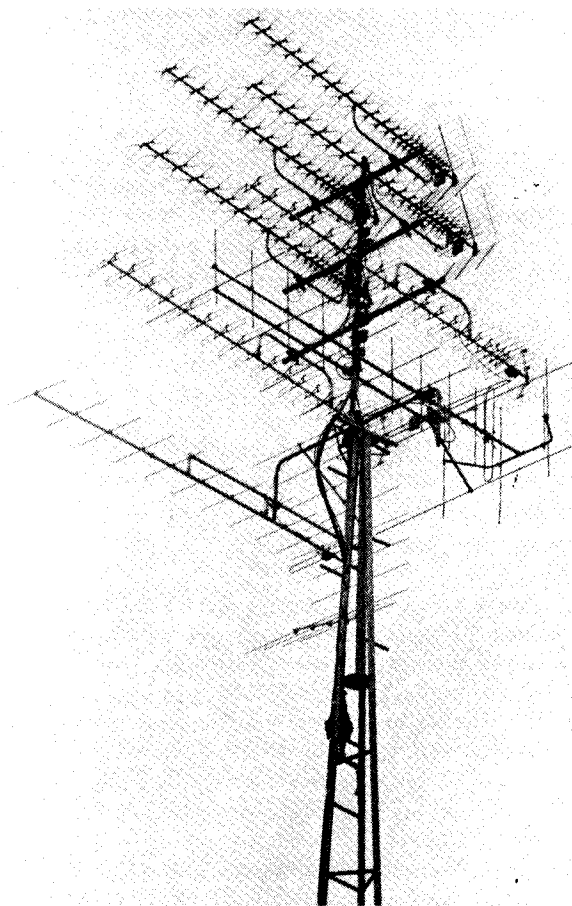
Garex Electronics (7 Norvic Road, Marsworth, Tring, Herts HP23 4LS) have expanded the range of accessories to go with the famed SX200 v.h.f./u.h.f. scanner. The H01 frequency converter gives coverage of the 96-108MHz band (or 88-108MHz to order). It's a downconverter for

in-series connection and costs £35. A converter for 200-400MHz is promised. A signal strength meter kit drives either a meter or bar LED display: this costs £13.75 (meter and stand assembly £16.50). Additional memory capacity (an expansion unit) is promised, also an auto a.m. selector for use as an airband monitor and a v.h.f./u.h.f. notch filter. Prices don't include VAT. The SX200 series has proved to be very popular with TV-DXers due to its 26-88MHz coverage – it's ideal as a video surveillance monitor, particularly on weak signals.

### **News Items**

**Holland:** AFN-TV is now operating from Soesterberg on ch. E71, at some 25kW e.r.p. (vertical). The standard AFN-TV pattern and a "simple" test card F are used.

**Belgium:** The ch. E25 transmitter reported as being a Wavre replacement last month is in fact located in central Brussels, near the Botanic Gardens. The e.r.p. is 5kW and the station has been received by several DXers at various distances.



*The impressive array of u.h.f. and Band III aerials on Ryn Muntjewerff's mast at Beemster, Holland. Details were given in the April issue (page 324).*

out inside the set!). The original primary winding is retained to feed the voltage doubler circuit. The new sense winding consists of 14 turns of 7/36 PVC wire wound close over the outside of the retained mains winding. When complete, the whole core assembly can be secured with epoxy adhesive and held in a vice overnight. Construction of the unit is not critical though the usual safety precautions should be taken, i.e. no exposed live parts. Alternative transistor types could of course be used.

With VR1 and its series resistors of the values shown,

the maximum capacity is some 300W. Calibration was carried out using various sized bulbs, calculating the trip current from these. The setting varies from chassis to chassis of course. Set VR1 so that the circuit breaker just trips, then back it off a bit. The range at the high current end can be increased by opening S2 to reduce the voltage available at VR1. A three-way switch with extra resistors could be used for greater flexibility. The limiting factor is the relay's contact rating (10A with the suggested relay).

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# All at Fours and Sevens

**Les Lawry-Johns**

Have you ever thought about the numbers four and seven? Frankly, I'd never given them a thought until the other day, when a series of sets came in and the coincidence left me wondering. It's not every day that we're kept so busy at present however, so we rolled up our sleeves and prepared to do battle.

## **The KT3**

The first set in line was a Philips KT3. It was reported not to work at all. So we dived straight at the right side power board and accused the  $4.7\Omega$  wirewound surge limiter of being open-circuit, thus removing the supply to the chopper. It was and a new resistor put things right without further delay.

## **The 9800**

The second set was an Ultra 6749 (Thorn 9800 chassis). Apart from a degaussing click when it was first switched on there didn't seem to be much happening. So we asked the mains rectifier thyristor whether it was being supplied at its anode. It was. So the MR510 series diode was o.k. There were no signs of life at the other two legs of the thyristor however, and this led us to suspect the start-up circuit. We looked at the upper power board where the start-up circuit, transistor VT810 etc., lives. The start-up pulses are fed to the thyristor via R814 on this panel. R814,  $470\Omega$ . It was open-circuit of course, replacement restoring normal working.

## **Fancy That!**

The next one began to make me think. It was a Bush set (Rank A823 chassis) with a faulty tripler. It had damaged the associated chassis-connected resistor. It's value?  $470\Omega$ . Then we had an ITT set, CVC5 chassis, suffering from poor focus. This was cleared by replacing the resistor that feeds the focus stick. Value?  $4.7M\Omega$ .

An amplifier suffered from short-circuit 2N3055 output transistors. As a result the emitter resistors had been damaged.  $0.47\Omega$ . I was afraid to lift the old Thorn 1500 on to the bench because I knew without a shadow of doubt what the cause of the loss of sync was going to be. R44 of course:  $47k\Omega$ .

## **Voodoo Numbers**

While I was glad that the jobs were all simple for a

change, I was wondering when I'd encounter something without these voodoo numbers being involved.

So this chap struggled in carrying a CVC9. "Ah ha!" I thought. Tuner selectors no doubt. It wasn't. The problem was no results. We found that the h.t. fuse feeding the line output stage had blown. Naturally our first check was on the boost reservoir capacitor under the line output transformer. It was short-circuit.  $0.47\mu F$ ...

## **The Ferguson TX90**

We haven't encountered many of these little sets so far. This one came in with the complaint of very poor sound. The nature of the fault suggested that the demodulator coil L104 was way off tune, and the presence of a  $390pF$  polystyrene tuning capacitor in parallel with it was cause enough for us to replace this item. The sound then boomed out loud and clear, with only a trace of buzz which a touch on the core of L104 cleared.

Whilst looking at the circuit my eye was caught by the RGB output stages. Each transistor has three parallel  $47k\Omega$  resistors as its load, i.e. there are nine of them in this part of the circuit alone. There are four  $47k\Omega$  resistors in parallel in the boost regulator circuit, also four  $270\Omega$  resistors in series. The field output stage bias is provided by four  $6.2k\Omega$  resistors in series. We're told that this is all in the interests of reducing the total number of different components required in order to keep within the capabilities of the production line equipment. At least the equipment doesn't insist on components in the 47 series...

## **Mr. Neck Pain**

At last the numbers game seemed to have come to an end. A rather strange gentleman next brought in a Pye CT218/1 (717 chassis). Although he was a strapping big fellow he started on about himself at great length, in this irritating sing-song voice, until I abruptly asked him what the hell was wrong with his set.

"Ah yes. I had trouble carrying it in you see because of my bad back. Haven't been to work for a long time because of it. Must see someone about it but I can't afford it. So I'm hoping the repair won't cost too much because my children will be visiting me this weekend and would like the television. My wife left me a couple of years ago, so I only see them every other weekend. Don't know why she left me. I've always worked hard. I'm supposed to be building a wall for this chap but my back won't let me. He keeps on about it..."



"Could I have your name please?"

"Oh yes. It's Nick Payne. That's right, Nick Payne. I told this chap that I couldn't build his wall this week. He got quite nasty about it. Said he'd been waiting for six months. But I can't help it if my back's bad.

"Do you build walls and things for a living then?" I asked, like a fool.

"Oh no. I'm a railway guard. Just do building work in my spare time. When I can that is, but I can't when my back's playing up."

"Well now, what's wrong with the set?"

"Well it sort of breathed a few times, then it went off. When I say breathed, it sort of fluttered – like it's been doing each time before it blew the fuse. I kept replacing the fuse, then put a stronger one in. Now it doesn't blow the fuse, it doesn't go at all, if you see what I mean Mr. Lorryjohns.

To cut a long story short he wanted the set there and then because of his children. So I lent him one for the weekend.

"Thank you Mr. Lorryjohns. Now could you carry it to my car? Because of my back you see."

### **The 18in. Pye**

At last I was left to battle it out with the 18in. Pye. This and its close relative (Philips 570) are quite well known to me, so I didn't have any real misgivings. I checked the voltage-regulator thyristor with the ohmmeter. No shorts, but the 3.5Ω wirewound surge-limiter (part of the rear resistance assembly) was open-circuit. Check carefully for h.t. shorts. None. So I fitted a 3.9Ω, 17W wirewound across the defective dropper section, then checked the mains fuse. This should have been a 1.6A anti-surge type. It was 3.15A. I decided on a middle course and fitted a 2.5A fuse.

Crossing my fingers I switched the set on. It behaved quite nicely, and there was just over 150V at the end of the dropper. Then the over-voltage glow switch started to flash, indicating that the h.t. was pulsing. Time to switch off. While I was still looking in the back however there was this brilliant flash. Nearly blinded me as the mains fuse blew to pieces. Now there are only two things that commonly perform this caper. One is the mains filter capacitor, the other a shorted bridge rectifier diode. The filter was in order but two of the diodes in the bridge were short-circuit. Two new BY127s and a 1.6A fuse were fitted. Check again for shorts, avert eyes and switch on.

The set once more came on nicely enough. Then started to pulse. Next the fuse blew. This time the line output transistor was short-circuit. I replaced it with a BU208A (for convenience), and for good measure also replaced the BT106 thyristor. "That'll do it" I thought. Thought wrong. The glow switch still flickered as the h.t. pumped.

I checked the resistors in the thyristor control circuit, also one or two suspect capacitors. All perfect. But then the set did start up perfectly. So I wouldn't find a faulty part no matter how hard I looked. Something then stirred in my sluggish mind. I looked at the BR101 that triggers the thyristor. A gate controlled switch. Search for but can't find one. Why? The reason I don't keep something in stock is usually because time has proved that something else does the job. In this case a BRY56. Check connections and fit it. Bull's-eye!

The set behaved impeccably and now waits for Mr. Pain in the Neck to return my loan set, which so far he hasn't done. Perhaps he can visualise his bill.

# next month in

# TELEVISION

## ● SERVICING THE SONY KV2000UB

A comprehensive fault finding guide for this popular Sony set, covering both the Mk. I and Mk. II versions, by David Botto. Features of the set include a chopper power supply, GCS line output stage and discrete component colour decoder.

## ● STEREO TV SOUND

It looks as if four totally different stereo TV sound systems could be in use world-wide in a few years' time. There's more than meets the eye to the problem of adding a second sound channel to a TV transmission. It's not just a question of bandwidth: various interference problems make such systems difficult to engineer. David Looser explains.

## ● TV FAULT MECHANISMS

Several factors contribute to the development of faults in TV sets. These include weak points in circuit design, the use of underrated components, mechanical problems with component mounting, poor layout and inadequate quality control. It's a great help with servicing to be aware of these points. Tony Thompson explains how faults tend to develop in a chassis.

## ● VINTAGE HI-FI SOUND UNIT

Adding a decent push-pull audio output stage makes a great difference to sound quality. The problem is how to cater for the heater and h.t. current requirements. This plug-in unit provides a neat solution based on a couple of ECL80s. A Chas E. Miller vintage feature.

## ● TEST REPORT

The increasing number of transmissions, wanted and unwanted, that crowd the bands present problems for the aerial rigger. The ideal solution is to use a spectrum type meter. Eugene Trundle reviews the Unaohm EP730FM panoramic field strength meter.

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# Some Confessions

Les Lawry-Johns

It's either that I'm getting old and senile (true says HB) or it's that I'm drinking too much in a frantic effort to thin down my blood (my story). The result of a recent blood test showed it to be 70 per cent proof. Maybe this explains my antics, which are becoming more and more worrying. Listen to this.

## The 3500

You'd think these elderly Thorn sets couldn't possibly cause a problem. They never used to. When I was capable of rational thought, that is. Anyway, June phoned to say that her's had gone wrong and that she couldn't bring it in. It's the large 26in. version in a heavy cabinet, so this was understandable. I said I'd call. At the same time another lady popped in to say that her large G8 required attention and would I call. I thought I'd do June first, then pop over and do her. June said her colour had gone (I thought).

So, armed with the usual boxes plus a 3500 decoder panel, a G8 line output transformer and tripler, I set off. On arrival at June's I was savaged by her dog. My fault. I'd gone in the back way and opened the kitchen door. I was flat on my back with him about to rip my throat out when a puzzled look came over his dear old face as he recognised whom he was about to kill. "Get off Piddler you fool, its only me" I gasped. Then he trotted off to find his ball and threw it at me, thinking it was fun time. June came down from wherever she'd been and dragged him away, enabling me to collect my things and go through to where the set lived.

I switched it on and it hummed away to itself, but no colourless picture appeared. I queried this with June who insisted she'd reported that the colour went first, then the set went off. Ah. Remove rear cover and check voltage at h.t. fuse. 30V instead of 60V. So I raised the right side line timebase panel and unhooked the tripler. Still 30V. I then checked the R2008 line output transistor which was o.k. and went on to check other things that tend to load the h.t. line. Nothing came to light. I was inclined to suspect the e.h.t. transformer, and thought it would be prudent to nip back to the shop, pick up a spare panel and fit this to clear the job up quickly. It took some ten minutes, during which time Piddler forgot who I was which led to a repeat performance.

"Stop it you daft bugger. Go and find your ball and leave me alone for Gawd's sake." He trotted off into the lounge and settled on the armchair next to the set. Once more June dragged him off and I was left to fit a replacement panel. Hummm the set went, and again there was 30V at the 60V fuse. Check tube base voltages for clues. Cathodes normal at over 100V – but so were the grids. These should have been at zero or slightly negative. I could hear a slight bubbling noise and the penny then dropped. No negative supply to the grid bias control meant that the tripler wasn't working. Oh dear. Off went the set and off went I to get a tripler.

Something was worrying me. If the tripler had caused the trouble in the first place it could well have damaged the transformer on my replacement panel. So I thought it

would be wise to pick up another working panel as well as a tripler – if I had one. I managed to find one and test it in the rig. It said it was o.k. Back to June's. This time Piddler wagged his tail and dropped his ball under my feet. Over I went and bang went the panel.

"I hate you, soppy great sod" I bawled.

"Come along darling" said June as she dragged him off again.

I fitted the tripler first and my fears were confirmed by 30V at the h.t. fuse. Fit spare panel. The e.h.t. now rustled up nicely, but the Channel 4 test pattern lacked height and linearity. Whilst I was adjusting the controls the 60V fuse failed. It hadn't done this before so something new was afoot. The R2008 had shorted – and I was at the end of my tether. Blinking back the tears, I fitted a new transistor and wondered what would happen next.

With a new 2.5A fuse in place the picture was back and I carried on setting up the test pattern, finding it difficult to obtain full height without a fold-up at the bottom or teletext at the top. At last it was done and I reported to June. She surveyed the picture and expressed satisfaction. Suddenly there was a clonk as something dropped down and the picture became severely rippled. I knew what had happened. Tripping over Piddler's ball had jolted the panel with the result that the core of the coil in the 60V line had been loosened. It had now dropped on to the decoder board.

Once more the rear cover was removed, after which the core was retrieved, fitted and secured. I was paid off and departed, cursing myself at making a right muck up of a straightforward job. At least a G8 wouldn't cause any troubles. Not a dear old G8.

## The G8

Still feeling confused, I arrived at my next destination. The door was opened and a pretty little bitch hurled herself at me. After various doggie pleasantries she ran through to show me where the set was. Taking the back off, I checked the left side fuses to ensure that h.t. was present. It was, and as expected the 800mA fuse on the right side scan panel was open-circuit. I checked the current briefly. Over 1A and the line output transformer was discoloured. A new transformer was fitted with no trouble at all. The snag was that I'd forgotten to pack 800mA fuses. Since the normal current is under 500mA, I fitted a 630mA anti-surge type. The set then worked nicely and after being paid and saying goodbye I prepared to depart.

As I was about to drive off there was an irate call.



*One way of seeking business, or  
"Oh Lord would it spoil some vast eternal plan  
If I were a wealthy man?"*

"Didn't last long did it?" So back with the gear and I could hear the power supply tripping away. The 630mA fuse had failed, but why was the power supply tripping? Absence of the load after failure of the fuse should have produced sullen silence.

I then did what I should have done initially. I'd merely checked that the h.t. was present, not measuring it carefully. It was 220V, not 200-205V. I set it at 200V and the tripping stopped. The load on the right side fuse was under 500mA so I went through my pockets. Joy – an 800mA fuse!

"There'll be no callbacks this time madam" said I, wishing that I could be a bit more sure. All was well however and it was back to base, feeling shattered at this lack of expertise, care and ability to think straight.

### The Fidelity

A Fidelity CTV14R colour portable was awaiting our (lack of?) attention. We'd sold it a year or so ago. The owner's complaint about it was repeated but intermittent shut down, reverting to channel one each time. He said it was random channel change, but it was really shutting down then coming on again in the start-up condition.

Slight pressure on the front panel produced the shut down and restart. A tap on the top did the same. So we removed the back and applied pressure here and there. It seemed that the front panel was the focal point, so we removed it, expecting to find a cracked track or a dry-joint. No amount of disturbance would produce the shut down with the panel out however, so we tried the main panel. This did it and out came the panel. Again no disturbance would produce the shut down. Tapping the now nearly empty cabinet did. I was puzzled and idly tapped the tube base – very lightly. That did it. Oh please, not the tube! Lightly disturbing the base panel then led us to the focus control, where the earthy end was not securely bonded to the print. Resoldering this restored continuous operation. Well, well!

### Greetings

Best wishes to Alan Daines of Canterbury, a hard working member of the clan. Keep it going Alan. Message via Stan Westover of SEME. Thanks to A.S. Foster of Brixham, Devon. The doctor had only one hand on my shoulder, rest assured. They don't really do that... do they?

# Servicing the Sony KV2000UB

## Part 1

David Botto

This was one of the most popular Sony TV sets. There are two versions, the Mk. I and Mk. II. They differ in many respects, but it's simple to find out which version you have on the bench. As is usual with Sony receivers, the KV2000UB is made up of a number of printed circuit boards that are identified by letters. In the Mk. I version there are two main signals panels, A and B: the Mk. II version has a single, larger A panel containing the circuit functions of the two previous boards. Looking into the rear of the Mk. II version with the back removed, you'll see the larger A board mounted vertically on the left-hand side. Much of the discrete component i.f. and decoder circuitry used in the Mk. I version is replaced by three i.c.s on this later panel.

Power supply panel F is at the bottom left. The mains bridge rectifier is followed by a transistor chopper circuit which incorporates three protection arrangements, ECL (excess current limiting), ECC (excess current cut-out) and OVP (over-voltage protection). These protective circuits are well designed and if a fault condition causes any one of them to sense that all is not in order the receiver trips or shuts down completely. The power supply circuit (Mk. I version) is shown in Fig. 1. The panel is accessible and dealing with faults is straightforward – provided you understand the principles of operation.

The a.c. mains supply passes via switch S901, connector F1, the mains fuse and filter then R602 (2.7 $\Omega$ , 7W w.w. non-flammable)/thermistor TH601 (part no. 1-800-356-00) to bridge rectifier diodes D601-4 (four U05Gs). The 320V produced across reservoir capacitors C606/C621 is fed to the chopper circuit via fuse F602. T601 is the chopper transformer and Q607 the chopper transistor. The 18.5V supply at the collector of the driver transistor Q606 is derived from the 320V rail via R617 (33k $\Omega$ , 7W metal oxide non-flammable).

Transistors Q604/5 are connected in an astable

multivibrator circuit that acts as a pulse-width modulator. The start-up supply for the multivibrator and the error amplifier transistor Q601 is obtained via R604 and R605 (both 47k $\Omega$ , 1W metal oxide non-flammable). Once the circuit is working normally these stages are supplied by D609/D614 which produce 21V across the reservoir capacitor C612. The emitter of the error-amplifier transistor is held constant at 12V by R612/D605 – R612 should always be replaced with a 1W type.

The multivibrator free runs at about 10.8kHz – measured using our workshop frequency counter. In normal operation it's triggered by pulses from the line output transformer T801. In the Mk. I version these are derived from tag 4, which also supplies the 33V rectifier D803; in the Mk. II version they are taken from tag 6 which supplies the 18V rectifier.

Preset VR601 sets the voltage at the base of Q601. This voltage is derived from the 135V h.t. line via R607 etc. and varies with any h.t. voltage fluctuations. Q601's collector voltage is thus varied to provide the control action – at the junction of R615/6 in the pulse-width modulator circuit. If the voltage at the base of Q601 falls, the on time of Q604 will be increased, and vice versa.

In addition to the 135V supply, panel F produces a 16V start-up supply for the line oscillator i.c. This is developed across C626 and appears at pin 2 of connector F3.

The ECC circuit operates if the power supply's output is short-circuited or more than twice the correct load current flows. Under these circumstances the voltage across C610, which is charged via D606/R614, rises sufficiently for Q603 and Q602 to latch on, shorting the base of Q604 in the multivibrator circuit and thus killing the 135V h.t. supply.

The ECL circuit operates if the peak current flowing into the load exceeds 1.3A. Under these circumstances the voltage across R628 will be sufficient to turn Q608

# Tiny Tim's Dilemma

**Les Lawry-Johns**

Tiny Tim sat on his bench stool and looked at his little feet swinging beneath. He looked back at his desk, at what was causing him such acute pain. His bank statement said he'd a small amount in his current account. The income tax man said he owed a great deal more. The VAT was due and the wholesalers' statements completed the mess.

What was Tiny Tim to do? Go into the red? He already owed the bank a lot of money for something else, so he didn't feel inclined to throw himself on their mercy any more – even if they would play with him. He could throw himself off a cliff, but that might hurt. So Tiny sat and pondered. It was easier than working. After all, he'd worked his little fingers to the bone for more years than he could remember, not even having a day off, except Christmas Day that is. Even then old Fred had brought his set in at seven o'clock one Christmas night, which made Tim very angry though he didn't show it – good will to all men, except Fred. Now, after all that work, what had he to show for it? A nasty great tax demand for a start.

## War Effort

Tim thought of the time years ago when he didn't have to work so hard. On D-day, when the soldiers were storming ashore amidst all that flack, Tiny Tim was in Gibraltar unpacking Blackburn Barracudas from their crates and helping to assemble them. He then helped to take them to bits again for crating and sending on to India. This procedure had puzzled Tim until he was told that they were originally unpacked and flown to India. As they needed a complete overhaul when they arrived it had been decided to ship them all the way instead. But no one had issued an order to stop the unpacking. So they were unpacked and built, then unbuilt and repacked and put on another boat. Thus Tim's war effort never received the acclaim it deserved. But the sun had shone and Tim had got his knees brown and had been repeatedly thrown out of the bars on Main Street – because he didn't like the pianist playing the White Cliffs of Dover and kept throwing a chair at him.

He'd done the same thing in Alexandria and got thrown out of the bars in Beer Street. This was the time when Subby Thomson was shooting down those Junker JU52s that dropped the cornettos over Benghazi. Oh dear how Tim's little mind rambles on. He was young then, and naughty of course. Tales have it that he should be blind, but instead he's just short-sighted. He got fed up last year, not being able to see properly through his glasses which he's repeatedly mended for the last twenty years or so. So he went off to see the man who makes you see better and ended up with an expensive pair of spectacles that enabled him to see a bumble bee about a mile away. He was so pleased, until he discovered that he couldn't see anything less than two feet away. So his nice new glasses remain in their case and he still has to wear his battered ones.

Tim sat and looked at his feet, or rather his shoes. His old shoes. He'd like some new ones, even if they did come from Italy. But he certainly couldn't afford to buy a pair with all this tax hanging over him – especially since Tinker

Bell had demanded a new gas cooker, and had got it of course. So he'd have to put up with the pebbles hurting his little feet as he walked his dog across the car park to where Peter Ripley parks his nice new car. Peter always laughs when he sees Tim, and Tim's glad he's so happy. Must be something to do with his wife being so pretty and all that.

## Memories of FJC

Tim scolded himself for being so selfish. He mustn't want new things when he can make do with old ones. He remembered being scolded by F.J. Camm, the original editor of *Television*. F.J. had told him off for sending in too high an account for answering readers' queries. "Two and sixpence is too much, especially as they are mainly repetitive." So Tim had knocked ten per cent off each monthly account for a while. For a little while.

F.J. was a formidable man. Someone not to be trifled with. After all his brother Sidney Camm had designed those lovely Hawker aircraft, including the Hurricane which Subby Thomson used to shoot down the JU52s. Yes indeed, F.J. was a man to be reckoned with in the Practical days. Not at all like the present editor who is kindly and helpful, always ready to cut large tracts of nasty bits out of Tiny Tim's articles so as not to offend our readers, who are such sensitive souls. I bet they didn't get slung out of the bars in Alex during the war. Or in Gib.

## Thirty Years Ago

Tim remembered the very first article he'd submitted to F.J., thirty years ago in 1954. On servicing the HMV 1807. Tim had suggested that this could form the start of a series on servicing TV receivers – practical hints on commercial models. "We shall require more than one to start a series" came the reply, "so we suggest you submit a further three or four." Tim struggled and came up with a further couple of hundred or so and blushes to think how serious he was, studiously writing them all with his little pen because he couldn't afford a typewriter. Tinker Bell bought him one for Christmas some years ago, so that he could earn more money to buy gas stoves and things like that.

So it was that in September 1954 we kicked off: "This series of articles is designed to help those who possess a commercial set of popular make, or who may be asked to help in the servicing of such a receiver. The whole point of these articles is that nearly every television set possesses its own peculiarities which, if known, make servicing much simpler. Time and again the same faults crop up with surprising regularity." There was a lot of "kitchen table" servicing back in the days when sets were cumbersome but amenable and service engineers were few and far between. We've come a long way together since then.

## Back to Earth

After a sleepless (almost) night Tim came down to see what bills the postman had brought to upset him further. A nicely typed letter caught his eye. It was from his accountant. "Don't pay that tax demand Les (I mean Tim). It's a mistake and you've paid too much already. Wait until you hear from them to confirm our figures." Oh Glory be, Glory be – and a nice new pair of shoes. The little angel that used to sit on Tim's shoulder and look after him is still there after all. And Tim thought the bitch had gone.

cause no problems and will, I believe, result in noticeable improvement in sound quality.

I use a modified Philips Model 1250 (K30 chassis) which accepts baseband signals from a Grundig 2 × 4 Super and a modified Philips N1700. Video and audio switching is performed within the TV set, the selected video signal being fed to the PAL decoder and the selected audio signal to a socket at the back. The audio is

then connected to the auxiliary input of my Quad 44 preamplifier. The internal audio amplifier in the TV set is not connected, as the volume control used with the TBA120 is not available for external inputs. I haven't bothered to make alternative arrangements for this because I wouldn't use them anyway.

*David Looser,  
Ipswich*

## On being fooled

*Les Lawry-Johns*

Just when you think you've completely mastered a particular chassis and feel that it can't hold any more heartache for you, one comes in and grabs you by the short and curlies. I'm sure it's done to deflate one's ego – if it ever gets a chance to inflate.

### The T20

A Rank T20 sat on the bench and looked at me. I looked back and sneered. "I'll have you done and working in five minutes" I told it. The sheet said no results. Well, what else would it say?

I whipped the back cover off, plugged it in and waited to see if the tube's heaters glowed. They didn't. I applied the meter to the body of the BU208A line output transistor, expecting to find an unenergetic 200V. The reading was low. This suggested that the BU208A was short-circuit: removing the collector screw and checking with the ohmmeter showed that it was. So I fitted another and disconnected the tripler, just in case. I switched on and the heaters glowed. A nice rushing noise came from the speaker. I advanced the lead to the tripler input. The tube's heater went out and the sound died.

I removed the lead and the set remained quite dead. So I switched it off and on again. Still nothing and the reading across the new BU208A was low. I stamped my foot in anger and the cat ran out through the kitchen window. Another BU208A up the spout. I fitted a second one and a new tripler. All was ready. Switch on, buzz, nothing. The voltage at the collector of the BU208A was this time 200V. So I went through the usual routine: check the resistors, the low-value one over on this side and the high one over on that; check the EW modulator diodes; check the line driver transistor and its supplies. I disconnected the new tripler just in case. The sound boomed out and the heaters lit. After checking a few capacitors I connected the tripler again. Set dead but the BU208A lived on.

Think. If the new tripler is at fault why isn't it hurting the BU208A? It must be passing a high current through the protection circuit. Fit another tripler. Just the same. Think again. Something connected with the tripler has happened, probably as a result of the original faulty one. This means removing the panel yet again to check through the small items on the protection subpanel. I felt angry and wished the cat was around so that I could kick it.

I shouted out to Honey Bunch "bring the bloody cat in".

"Oh no, not for you to kick it" bawled back H.B. "She's your little pet and the only time you want to kick her is when you can't do your job properly. Kick yourself instead."

I did and it hurt. So I took the panel out and carefully checked the small items on the subpanel. 5D5 was leaky (read both ways). "It's all right dearest, call Spock in, it wasn't her fault it was 5D5."

"Heaven protect us from him" mumbled H.B.

Thought: if a faulty tripler can murder a hefty BU208A it can certainly do in a 1N4148 diode.

### The G11

Ah well, a dear old Philips G11 won't be any trouble at all. Probably a short-circuit BU208A, defective 470μF h.t. reservoir capacitor, possibly a short-circuit BY223 EW modulator diode and maybe a faulty BD238 EW modulator driver transistor over on the other side. No bother, nice after the agony of the T20.

Take the back off and note that the two 3.15A mains fuses have shattered. Simple, just check the bridge rectifier diodes. Two short-circuit. In went a couple of BY127s and two 3.15A fuses. Bob's your uncle.

Bob's not my uncle and never was. Bang went the two fuses. Check more thoroughly. A short-circuit OT121 thyristor. Well I never. Fit a new one and check carefully for shorts with the degaussing plug out. No shorts found. Fit two new fuses and switch on. Bang.

"Bring that bloody cat in here. She's spoilt rotten and I'm going to let her know who's who around here. This shouldn't happen to a dog. And where is the dog anyway? Never around when he's wanted."

"Ben can't help you dear. The cat can't and neither can I. Besides that the cat's busy eating the dog's toast."

"Why doesn't she eat her own food?"

"She has."

Bloody rotten cat. Everyone's spoilt in this place. Even H.B. It's only me who's not spoilt, flogging myself to death to keep that lot happy. It's not fair.

"It's probably a dry-joint" said H.B. as she went upstairs to talk to the bird. Oh yes, the bird's spoilt as well.

I looked at the G11 again. It looked back out of the corner of its tube and laughed. I'd a spare power panel and was sorely tempted to fit it and forget the whole thing. But no, too easy. Taking the easy way out is not on. At least not till the going gets really rough. I had time. All I needed was patience.

Check the h.t. fuse to ensure it's the right value. I once found a piece of wire across the fuseholder, reflecting the load back to the mains fuses. Not so this time. It was 1A and there were no shorts up top. So we were still on the power panel. Something was shorting on load and didn't live too far from the mains input. Recheck the diodes, recheck the thyristors. I'd replaced one, why not the other? I did and the fuses still went bang. I went through that board with a fine toothcomb, disconnecting this, that and the other, until my attention was caught by a fairly low reading that should have been high with the other components out of circuit. Then I saw it. A black mark on one of the VDRs. It was reading 15Ω when it shouldn't. So that was it. Voltage dependent be bugged. The battle

was over and we were short of 3.15A fuses. "Come on then nice pussy, there's a pretty girl."

### **Tinker Tim**

A truck pulled up outside. On the back were a load of bits of metal and a couple of old fridges. I groaned to myself. Tim had been over the tip and had no doubt found a discarded TV set he thought I would make as good as new for next to nothing. In he came with a Decca CTV - 18in. Bradford chassis.

"This belongs to my next door neighbour. Asked me to run it down to the best bloke I know."

"You mean the cheapest cheapskate in town Tim."

"Oh no Lawry. We all know you're a fair bloke who's got to make a living."

So I looked at it. It didn't have a plug on the end of the lead, so I proceeded with caution. The meter recorded a dead short across the mains. I took the back off and slid out the chassis. A light shone on the on/off switch showed the brown and blue leads connected together on one tag. Charming.

## **Teletopics**

### **VCR NEWS**

VCR deliveries in the UK showed a further slight fall in the first quarter of 1984. As mentioned in the June Teletopics, deliveries in the final quarter of 1983 fell by 40 per cent in comparison with the same quarter in 1982. The reduction in the first quarter of 1984 was 44 per cent. It seems that the entire W. European market is experiencing a downturn: European Commission figures show a decline of just over 20 per cent in deliveries during the first five months of the year compared to 1983. The Japanese Ministry of International Trade and Industry, which is responsible for overseeing the EEC-Japanese agreement on VCR deliveries, has as a result authorised Japanese VCR manufacturers to lower prices by 5-7 per cent. In contrast, the UK TV market during the first quarter was buoyant, with CTV deliveries up 15.8 per cent (55 per cent in the case of small-screen colour sets).

The point at which the VCR market reaches saturation in the UK is open to speculation. A recent Key Note report suggests that saturation will occur when 60 per cent of households have a VCR, and that this level will not be reached until the next decade.

New releases include the first VHS machines from Pye and Toshiba. The Pye 65VR20 is a front loader with wired remote control and a suggested price of around £420. The Toshiba machines, Model V55B with manual control and V57B with remote control, are being assembled at Toshiba's Plymouth plant from JVC kits. The suggested prices are £450 and £490 respectively. Sony's SLHF100UB Beta hi-fi model, which was first shown at Cetex earlier this year, is now in the shops with a price tag of just under £600. The helical-track sound recording system is similar to that used in VHS hi-fi machines.

Alps Electric, a leading Japanese manufacturer of parts for VCRs, is considering establishing a factory in the UK. Discussions on grants and financial assistance are taking place between the firm and the Department of Trade and Industry.

"Well I'll leave it with you Lawry and call back later."

I shone a light on the volume control again and noted that it was of completely the wrong type: 50k $\Omega$  linear instead of 500k $\Omega$  logarithmic. Oh well. Out it came and a new control was fitted, wiring the leads to the volume control as found (not to the switch of course). Back went the panel and after a few precautionary checks I switched the set on. Turn up the volume but there's no sound. Turn it down and the sound comes up loud and clear. How can anyone do this sort of thing? I took it out again and reversed the outer contact leads. The sound was now o.k.

Only the height and linearity needed adjustment, despite a distinct crack around the glass base of the PL508 field output valve. We've seen this before however and know that the vacuum's not impaired despite the appearance. I wrote out what I considered to be a very moderate bill (daft really). When Tim returned he threw up his hands in horror. "The old boy'll never pay nearly a tenner for it. He only wanted you to look at it."

I won't tell you how the conversation went after that, but I shan't have the pleasure of Tim's company again. There was no old boy, don't worry about that!

The subject of VCR protection was mentioned in this column last July (Videotek's "cassette" which can be locked and loaded into a machine). AVF Ltd. of Dixon Street, Wolverhampton WV2 2BX have now introduced the Videoguard, a lockable, wall-mounted bracket which can be adjusted to suit most VCRs. The price is around £30. Grundig's new VHS model comes with a built-in lock, and it's understood that other manufacturers are likely to follow suit. Some lock designs permit the machine to make timed recordings despite being locked.

Dealers who stock prerecorded tapes and are unsure which of these might be "video nasties" can obtain a list of some 62 titles from the Metropolitan Police, A3(1) Branch, New Scotland Yard, Broadway, London SW1H 0BG. The list has been prepared by the Director of Public Prosecutions and is periodically updated.

### **TV SETS**

An old TV brand name, Philco, will shortly reappear in the UK. In the fifties Philco TV sets were produced at Chigwell, Essex. When the plant was closed in 1962 Thorn acquired the brand name and marketed Philco sets for a couple of years before dropping it. Recent Philco colour sets have been produced at Milan in a factory acquired by the Italian Philco company from Telefunken two years ago. Philco claim to have 12.5 per cent of the Italian CTV market at present. 22in. Philco sets are to be imported and distributed to independent dealers by CIH. If the move is successful the complete range of models, with tube sizes from 14 to 27in., will be made available in the UK.

Sinclair's 2in. monochrome TV sets, which have previously been available only via mail order, are now being supplied to retail outlets. The suggested price has been increased by £20 to £99.95. Akai is planning to enter the TV field. Sony has introduced in Japan a set whose picture can be reversed from left to right via remote control - it's intended for use in barbers' shops etc. where viewers may be watching programmes via a mirror.

The SGS-Ates 250V RGB output chip (see Teletopics, March) has now gone into production. The type number is TDA8150.

ITT have issued a safety warning concerning models CB502, CB602, CB702, CB0506, CB0606, CB9504 and



# The Tangled Web

Les Lawry-Johns

We'd known Mr. Spyder for a number of years and had always been on good terms with him. So when he popped in with his daughter's rather old monochrome portable we had no hesitation about accepting it for repair, even though it was a Thorn 1580 with valves and things in it.

"It goes all right for about half an hour, then funny things happen. Sort of goes into oscillation if you know what I mean."

So he left it with me and the hours of frustration started. Work on it till something else demands attention, put it on one side and go back to it later. This dragged on all over the weekend. The complicated colour sets that came in were repaired in no time with no bother worth mentioning. A new line output transformer here, a new tripler there, a replacement bridge rectifier, new tuner selectors – all run of the mill jobs that any fool could do. But that little portable had me by the short and curlies. Maybe it was because I've not been feeling too well lately and my mind's a bit cloudy. So on I blundered. As Mr. Spyder said, it went into oscillation after half an hour, first showing a very noisy picture.

My diagnosis was that the fault was in either the tuner or the a.g.c. circuit. I plugged in a spare tuner but the oscillation proceeded apace. So I checked the voltage at the collector of the a.g.c. transistor VT8. It was nearly 2V instead of 0.5V. All the associated components were checked and the main suspects changed, including the transistor itself. Something stirred in my mind. The transistor is gated on during the line flyback periods by pulses from the line output transformer. So I went over to the other side to ensure that the transformer's pulse winding (tags B and C) and its connections were intact and good. They were. Back to the i.f. strip.

The voltages around the i.f. transistors were correct but I changed the transistors just in case. I checked the decoupling, using a 33 $\mu$ F electrolytic and an 0.01 $\mu$ F capacitor as appropriate. All the capacitors were in order. In a fit of temper I decoupled the collector of the first i.f. transistor to chassis with the 33 $\mu$ F electrolytic, expecting the signals to vanish. There was a marked improvement and reception became almost normal!

I decided not to pursue this red herring and put it down to the capacitor's inductance. The a.g.c. transistor's base samples the voltage at the emitter of the video driver transistor VT5. Maybe the fault lay in the video circuits. There was a heavy negative voltage at the collector of the video output transistor VT6 instead of some 85V, proving that the whole thing was in a state of oscillation. I checked all the decoupling but nothing made any difference.

I put the chassis the right way up and looked at it. I was aware that something simple was eluding me and that I was too stupid to put my finger on it. I turned the set on its side once more and the picture became perfect. Put it down again and it burst into oscillation. I was amazed. Up, o.k. Then all buggery let loose again as it was put down.

A little voice said check the a.g.c. gating pulses right back to source. I looked at the small figure of E.T. He was pointing his finger at me as usual. So I plodded back across the panel from the pulse coupling/a.g.c. capacitor C55 to the source of the pulses, a potential divider across

the transformer's pulse winding. The resistors checked o.k. individually, but the reading across all three was high when it should have been low, i.e. the d.c. resistance of the pulse winding. But I'd already checked the winding which was in order. At last the penny dropped and I stared at the connecting leads, each in its Sistoflex sleeving. The sleeves are fitted to ward off the heat from the PL81 and PY81 valves, but the wire inside had burnt through and made only when the set was cold – or when it was turned on its side, sometimes.

A new lead dressed well away from the valves completed a very simple repair and left me feeling guilty. Why? Because of the severe line pulling that had accompanied the oscillation. This should have led to an early check on the reference pulses at source since they are also used in the flywheel line sync circuit. I'd put this down to severe video oscillation distorting the sync pulses. Live and learn.

When Mr. Spyder came back for the set he laughed as I told him what a headache it had been. "Just a little thing like that" he said.

"Clear off" I said, or words to that effect.

## Another Headache

Now you wouldn't think that a Decca Bradford (30 series) could give one a nasty turn. Normally they're no sooner in than out again. A shorted boost capacitor here, a faulty sound output stage there, no real trouble. Not until Mrs. Footrot arrived that is. Her son carried in the 22in. Bradford and didn't say a word. Mrs. Footrot made up for his silence.

"You put a new tube in this set three years ago. Here's the guarantee card showing that it still has another year to run. I'll leave it here until Saturday, so please give me a chit to say that you have it. You can't trust anyone these days." She rabbited on in a similar vein for quite some time before I could get a word in.

"What's wrong with the set please, Mrs. Footrot?"

"Oh yes, the colours are funny and keep changing. It's like watching disco lights."

So they departed and I took a look at the disco lights. It frightened me. At first only the corners flashed their impurity at me, then the centre joined in with an odd pulsing effect, the colours continuously changing. I pulled the green and blue drive leads off to leave the red display on its own. The screen showed a patch of red in the centre changing to green and blue while the outside corners were pulsing all three colours.

"Degaussing" I thought and showed it to Honey Bunch. She said she'd never seen anything like it in her life and I had to confess that I hadn't either.

"What does that?" she asked.

"The degaussing coils are being charged and discharged at a rapid rate when they shouldn't be" I explained weakly. H.B. trotted off to feed the bird and change his (her?) water, leaving me to check the degaussing components carefully.

They were all in order. I unplugged the feed to the degaussing circuit from the on/off switch. The display



continued apace. It was as if a dozen powerful magnets were being constantly moved about in front of the tube. I took the shield, coils and degaussing components complete from another set and fitted the lot in Mrs. Footrot's set. Still the same and I now knew what the trouble was,

though I didn't like to admit it. So I replaced the scan coils and the purity magnets. Still the same, confirming that the tube would have to be replaced. This restored normal operation. What the hell was going on inside that tube to make it produce such a display? Does anyone know?

# Teletopics

## **CED FADE OUT**

The CED video disc system, which was launched in the UK by RCA, Hitachi and GEC in October 1983, is being phased out. The original plan was to sell 25,000 machines during the 1983 pre-Christmas selling period and a further 100,000 machines this year but in the event only some 5,000 have been sold. The 40,000 players held in stock by Hitachi are to be sold off at £99 each, with 20 free discs. Discs will continue to be sold as long as stocks last – the present catalogue lists 250 titles.

RCA are reported to have made a loss of \$580 million on the CED disc system. Some 700,000 players have been sold in the USA since the system was launched there in 1981. RCA have announced that they will continue to manufacture discs for the US market for at least three years or as long as there is sufficient demand.

## **DBS PROGRESS**

A report to the Home Secretary by the DBS consortium (the BBC, the ITV companies and five non-broadcasting companies) says that considerable progress has been made with plans to launch the UK's DBS service. Agreement has been reached on making £350,000 available for the project's next stage, and a business plan has been drawn up. This envisages a profit of £300 million over a ten-year period after substantial losses initially (£320 million during the first four years). One assumption made is that viewers would be prepared to pay £20 a month, to include the cost of the receiving equipment, for three DBS channels. A more pessimistic projection suggests that the service would still find it hard to make a profit after fifteen years.

## **RTEEB EXAMINATION CHANGES**

Two new practical tests, at Part III level of Course 224 (Electronics Servicing), have been announced by the Radio, Television and Electronics Examinations Board. The tests are on VCR and colour television servicing.

## **TAKE-OVER BID FOR FIDELITY**

An agreed bid for Fidelity Radio, valuing the company at £14.1 million, has been made by Caparo Industries which had built up a 32.4 per cent stake in the company in recent months. Caparo Industries is a diversified engineering group headed by Mr. Swraj Paul who says that the aim in taking over Fidelity would be to get his group into "slightly higher technology". A counter bid was considered by Amstrad but was dropped on the grounds that the companies have similar product ranges and the same customer base. Since the Amstrad factory at Shoburyness is at present being expanded the company is not interested in acquiring Fidelity's manufacturing capacity. Amstrad's chairman Alan Sugar commented that Fidelity would be "a bargain at the price Caparo is offering". Fidelity had a difficult time during its last financial year, due mainly to problems with test specifications for its cordless tele-

phones and a difficulty with its new CTV chassis (a timebase i.c. that has been designed in failed to perform to specification initially).

## **MARKET BLUES**

The VCR, TV and other consumer electronics markets have been distinctly weak in recent months. VCR sales/rentals for 1984 are expected to end up at around 1.55 million compared to the level of 2.2 million reached in both 1982 and 1983. CTV sales/rentals are expected to be roughly the same as in 1983, though a peak was reached in the early months of the year. The situation is highlighted by comments made at the Thorn-EMI plc Annual General Meeting by Chairman and Chief Executive Peter Laister. For Ferguson, sales of TV sets and VCRs have so far been "substantially lower" this year than last. Thorn's rental operations have fared rather better however. Thorn claim to have 25 per cent more subscribers per outlet than any of the competition in the rental field and are maintaining CTV subscribers overall. In fact Thorn claim to be increasing their share of both the TV and VCR rental market. Peter Laister's comments on "new opportunities such as cable and satellite" are interesting. "In such cases we will invest to the extent of marking our position in their future, but will place limits on our short-term costs."

## **PHILIPS' TV MILESTONE**

Philips, the world's largest TV manufacturer, has now produced over one hundred million TV sets – that doesn't include those produced during the pre-war period! To mark the event, simultaneous presentations of 100 sets each were made at Eindhoven and in London. The Dutch sets were presented to Princess Margriet for use by the Red Cross while the UK sets were presented to the National Society for the Prevention of Cruelty to Children which is celebrating its centenary this year. Philips' Electronics UK chairman Anton Poot commented that it took 35 years for Philips to produce its first 100 million sets but that the second 100 million should be produced in under ten years – "every three seconds day and night a Philips set is sold somewhere in the world".

## **TV DODGER CAMPAIGN**

The Home Office has started a new campaign to catch TV licence dodgers. A fleet of 22 new vans, each costing more than £20,000 and ten times more sensitive than previous ones, will tour cities and major towns. Other elements in the campaign are computerised records that show unlicensed households, an increased maximum fine and a TV commercial.

## **TELETEXT ADVANCES**

According to research carried out by the ITV teletext service Oracle more than two million homes in the UK now have sets equipped for teletext reception. This represents a market penetration of ten per cent. Market penetration is highest in the London area, at 22 per cent, and in the socio-economic class AB, at 27 per cent, though

# Don't Panic

Les Lawry-Johns

If there's one thing you can't get in this job it's a big head. As soon as you've cleared up one impossible problem and are congratulating yourself (no one else will) on being a clever boy, along comes another swine that completely deflates you, leaving you lonely, frightened, deflated (always that) and dreading the next customer with a set that's "an easy job - won't take you more than five minutes".

It's all right for ET down there on the south coast, surrounded by his comrades, senior, medium and junior technical advisers plus a caravan full of thin wire specialists, but when you're on your own and there's no one to turn to except Honey Bunch who always diagnoses a dry-joint (very helpful except in the case of G11s where even I can often find the right one) it's more awesome. I can phone Geoff but he tends to laugh and say "you've a weirdie there old boy, let us know what it turned out to be - cheers". It's nice to have friends, real friends who send you funny cards when you're in hospital, wishing you the best of bad luck. Thank you Jan, Geoff, Eddie - I know you didn't mean it, er...

## The T20

Listen to this and wonder. A friend from the Medway towns sent the set along but I won't mention his name because he's a reader. I confidently approached it with my one ohm resistor, my BU208A, my 910Ω resistor and my BYX71s at the ready. But the problem turned out to be that the remote control receiver showed only a 0, which couldn't be moved, in the window. Despite my inclination to rush at the chips (SAS580/590) on the touch-tune panel I employed the slowly, slowly cathee monkey approach, which is to check the voltages carefully throughout to see where they vary from normal. I had the correct 200V h.t. supply on the line output stage panel so I checked at the EW modulator diodes - and was surprised to find negative voltages here. I looked at the meter and checked the 200V again. Yes, the leads were right. Move over and check the 12V regulator. Negative.

Feeling a bit shaken I made sure the diodes were the right way round and then checked the earth pin 4Z2-2 - second one up on the swing-down timebase panel. It was heavily negative, as was the earth on the line output stage panel. I could have kicked myself. The panel screws were loose and tightening them restored normal voltages and my sanity. The window still said 0 however and wouldn't

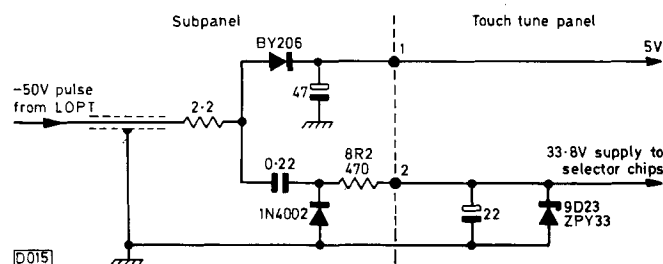


Fig. 1: Rank T20 chassis, touch tune power supply circuit. The tuning voltage is separately derived.

shift. So out came the panels involved with tuning and I soon found that 8R2 (470Ω) on the supply subpanel (see Fig. 1) had burnt out. I replaced it and the new resistor got hot with the voltage low at the pin 2 end. I accused zener diode 9D23 of being leaky but it wasn't. I replaced the SAS580 and the voltage remained low so I refitted it. Remove the SAS590 and the voltage goes up to normal. Ah ha! In went a replacement and we could now select half the numbers. A new SAS580 also had to be fitted before we had full selection. The set now worked well and we were left wondering whether the poor earthing on the line output panel had had anything to do with the demise of the SAS chips.

## Later that day

A chappie in the trade popped in. "Hallo Les, you don't happen to have a line output transformer for the ITT CVC32 chassis do you? I'll pay you for it."

I looked on the shelf. Only one left. So I let him have it. After all I wasn't likely to need another right away, was I? Not right away, no. Just next morning. I told the customer I'd phone him as soon as I'd got one and fitted it. Right away I phoned those nice people at SEME and, bless them, the parcel was in my hands within 24 hours. What a contrast to... well, never mind, you probably know who I mean.

When Stan Westover came in for his order later in the week I told him how pleased I was with this speedy service. "Think nothing of it" he smugly replied. "Yes Stan, but when I give the order to you it takes four days to come through."

"Well it has to be processed you see Les."

"Oh I see. Thanks for explaining it Stan."

Stan wasn't happy. The true explanation dawned on him.

"And in addition to that Les, I do take your order on Friday, so taking the fourth day as Monday it's still speedy service."

"Er, yes, of course" I mumbled. "Should have thought of that."

Why is it that whenever I try to shoot someone down in flames I always seem to get fried myself? Still he's not a bad bloke, really, and I don't mind HB making him a cup of coffee when he calls, not really. It would be different if he took milk and sugar in it. No wonder his humour has a bitter edge.

## More Panic

This chap came struggling in with a white Philips G11. I smiled and suggested that he waited a minute or two for my immediate diagnosis. He said it had given a couple of short cracks, then the picture had severely decreased in size and finally gone, leaving the sound and a small blank raster.

Two possibilities raced through my muddled head. The line output stage tuning capacitor could have gone open-circuit, resulting in a large increase in e.h.t. (hence the arcing). In doing so the beam limiter might have suffered, hence the partial shut down and loss of signals.

With these things mulling around in my mind I whipped out the power supply panel and attacked the beam limiter. The transistors read all right but I've been fooled by this before - they're interconnected. I unsoldered the npn one (BC148) and it read faulty. "What about that!" I thought as I fitted another BC148 and refitted the panel.

Switch on and check the voltage at the h.t. fuse. 100V instead of 150V. I pulled out the BU208A's plug to disconnect it, at the same time wondering why the fuse hadn't failed if the load was excessive. The voltage remained low. Out with the panel and in with my spare one. Still 100V – and the line output stage was still inoperative. Either the fault was still there or my panel was faulty in exactly the same way. I didn't believe that. Check beam limiter voltages which were again wrong. There was a line coming off marked "only on some chassis" – remote control ones. This was such a set. So I pulled out the lower plug and the voltage immediately rose above 150V. I replaced the line output transistor plug and the set burst into life.

"It's on the remote control panel" I explained.

"Never use it" he said. Coward to the last I let him take the set away without investigating further – having cleaned off the e.h.t. cap etc.

### ***The Final Drama***

We'd sold this Fidelity CTV14S some months ago to a couple we knew. We'd sung its praises and here it was tripping like mad. "Put it right in no time" I assured them.

I checked the usual things (the TDA2581 chip and dry-joints in the power supply) but they were without fault. When the line output transistor was disconnected the tripping stopped, but the transistor itself was all right. The services provided by the line output transformer all declared their innocence, so we were left with the line output transformer itself. This was of the original type, round and black. I whipped a stock set out of its box. The LOPT was smaller and white with the focus and first anode presets on it (these were on the tube base board on the set we'd sold).

"I'll have to phone for one. Won't keep you long. I'll give you a ring."

The husband was back a couple of days later, looking a bit peeved. "It's not come in yet" I explained. Just at that moment it arrived. "Oh good" he said. "I can wait for it then."

"Well, er, if you wish" I said dubiously. How right I was. The replacement transformer was of the same type as the one in the stock set, white with knobs on. It came with a small subpanel and a note giving instructions on the modifications required. So I suggested he popped off for an hour or so unless he wanted to stay and see me suffer. He said he didn't mind and elected to watch.

It's no easy job to remove the original type and I could hear him sighing as I struggled. Eventually it was out and the new one went in – much better. The original focus and first anode controls had to be removed from the tube panel and the leads from the new transformer fitted directly, but it was done at last.

Now was the time to test it. What if I'd been wrong? What if the set still tripped? Not giving a sign of my inner turmoil, I smiled and switched on. There was the usual grump and on it came. A pig looked at me from the screen and winked. I winked back.

"Well done" said Mr. Savage. "How much do they pay you for doing that?"

"They don't. They only supply the parts. The labour is one of love."

"Oh well. I suppose it comes out of the profit you make when you sell the set."

"Yes sir, all seven pounds fifty of it."

I could see that he didn't believe me but it's true, give or take a penny or two. I suppose I should buy in larger quantities to get larger discounts. Never mind, I was never cut out for business.

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# ***Vintage TV: The View Master***

***Chas E. Miller***

For several years after World War 2 home constructors of TV sets relied extensively on ex-services equipment – in particular the Pye radar i.f. strip, which operated at a frequency close to that of the Alexandra Palace transmitter, and the VCR97 electrostatic c.r.t. The latter had a screen diameter of about 6in., a length of just over 16½in., and a green fluorescent screen, so it could hardly be called ideal for domestic viewing! Nevertheless it found its way into innumerable amateur sets of the late 40s. As a matter of fact I've one on the desk as I write this, complete with its Mumetal shield!

It was obvious that something better was needed, and in 1949 a group of component manufacturers sponsored the design of a set that was to be made available in kit form and would be up to the standards of contemporary commercial models – in fact it excelled them in some respects. The result was the View Master, designed by W.I. Flack. Constructional details were sold in a packet for 5/- and the various parts were available from the sponsoring firms. Considering the general complexity of most commercial receivers at that time, W.I. Flack's design was little less than inspired and fully realised his hope that it would result in "a television set that embodies all the latest technical developments and when finished will be a credit to the constructor's workmanship and skill,

one he'll be proud to own".

So that the set's receiver section could be aligned by an amateur enthusiast without the aid of a signal generator, a t.r.f. design was chosen. The valves used were the well known (one might almost say notorious) EF50s. For the benefit of younger readers, these were among the first all-glass valves designed for h.f. amplification and were widely used in wartime radar equipment. They were not particularly small – somewhat larger than the latter-day PL508 – and were permanently fitted with a metal screening can that extended right round the base pins as well. The pins were a little too short for comfort, and much of the criticism levelled at the EF50 was due to poor base connections. For applications where expense was unimportant the valves were supplied with gold-plated pins to help alleviate the problem. On the good side the valve's mutual conductance was high for the period, at 6.5mA/V. Depending on circuit application, it could be controlled by applying between 0V and –6V to the control grid or 0V to –55V to the suppressor grid. Another advantage so far as the home constructor was concerned was the fact that services equivalents (ARP35, VR91) could be obtained from surplus stores at a fraction of the price.

Three EF50s were used to amplify the vision signal

# My friend Jim

**Les Lawry-Johns**

I've known Jim for a good few years now. He's in the trade and often pops in to buy some bits and pieces he needs and hasn't got in stock. Usually my last G8 line output transformer or 9000 tripler – you know, the kinds of things you're going to need during the next minute or so. He's not all that interested in servicing however. His main interest seems to be in building. The upshot is that whenever he gets a set he doesn't like the look of he'll bring it along with a comment like "have a look at this for me old chap, only I've got a floor up and really must fix it before the wife comes home". And off he goes leaving me with a bitch of a job.

## **The Thorn 9600**

He carted this Ferguson 9600 in and left it with me. The 2.5AT mains fuse had blown in a nasty way so I went straight for the filter capacitor, which was innocent. Next the bridge rectifier, which was short-circuit. So I whistled a happy tune as I replaced it, stuck a new fuse in and switched on. There was the usual pause, then it started up normally. A white line appeared across the screen so I checked the supply to the field timebase and then the output transistors. These were all o.k. It wasn't until I turned to the line/field oscillator subpanel on the right-hand side that I found a BC147 transistor (VT402) open-circuit.

With this replaced we had full scan, quite a nice picture and loud, clear sound. I then remembered something else Jim had said. Apparently the set often worked all right for some ten minutes or so and then tripped out. I left it on for some time and sure enough it suddenly gave a few gulps and went into a strike situation. I noticed that just before it did this the sound went down. So with enormous presence of mind I removed the 500mA fuse (F513) in the supply to the audio panel. The set then came on when asked to and apparently stayed on.

I removed the left-hand side audio panel and checked each transistor separately. They all proclaimed their innocence of course. The output pair were on heatsinks but the driver wasn't, so bearing in mind the loss of volume before the set tripped I reasoned (wrongly of course) that the driver could well be at fault. This is a BD386, which I didn't have in stock. I put in a BD204 instead, confident that it wouldn't give in easily. Quite right, it didn't. The set behaved happily for an hour or so then Jim came in to collect it.

## **Jim's Return**

Within the hour Jim was back with it. "Tripped after ten minutes" he said. So I removed the audio panel and left the set on without it. After half an hour it tripped. Back went the audio panel and the set played away happily enough for quite some time. Then the sound decreased and off it went into sullen silence. Everything shut down except the supply to the chopper circuit. I checked everything in sight and out of sight. Then I started to think.

The sound went down before the set tripped, and the

fault wasn't in the audio panel. So I removed the 500mA fuse F511 in the feed to the 24V regulator. This upset the field timebase but the set didn't trip. To cut a long story short, it wasn't until I removed the supply to IC2 (MC1358P) on the signals panel that the tripping stopped. When this i.c. was replaced our troubles were over. The intercarrier sound and audio preamplifier chip for heaven's sake. What next? Jim then came to collect the set.

## **The GEC-Hitachi**

An hour later he was back again. This time however he didn't lug in the Thorn. Oh no! That was just a forgotten incident now. This time he had a GEC set we didn't recognise. It was a C2265 (Hitachi NP81CQ chassis) and it took me some time to realise that what I took to be a chopper transistor was in fact a chopper i.c. (IC901, STR441). So I studied the notes in the manual, hoping to get a clue as to how to start the thing up. They did provide a lead, and when I put the meter on R605/6 in the chopper feedback line the set sprang to life. It frightened the life out of me because the sound had been left turned fully up. I turned it down and switched off. When I switched on again the set remained dead until I prodded around the feedback network – the chopper is a sort of blocking oscillator arrangement. The set then came to life. Until the meter probe slipped. There was a nasty flash and the 2.5AT mains fuse disintegrated. "Oh dear" I said.

Like a fool, I put another fuse in and tried again. FLASH! I checked the strange STR441 and found it short-circuit. So I ordered one and got it (along with some other things) next day. I fitted the three-legged device and bravely switched on. The fault was still there. I checked each item in the feedback network and they all read right. I then took them out to make sure. They were all right, so I put them back again and after that the set performed perfectly. Just another dry-joint? Must have been, but it certainly didn't show.

## **Thanks Frank**

On the subject of GEC I must pass on a message of thanks from several of my trade friends who have had cause to be grateful to Frank Pretty of the GEC technical advice department. He's been most helpful to all who have phoned asking for advice and have received more than they hoped for. I haven't had the pleasure of talking to Frank yet, but I very nearly did over the C2265.

## **The Passing of Ben**

You no doubt remember me chattering about our dog and cat (and bird). Well Ben isn't with us any more and we do miss him. Spock seems to complain all day long, loudly. Ben lost the use of his back legs and was unable to digest his food. He passed away peacefully but still seems to be around. Thanks Ben. I do wish that cat would shut up.

# Another Smash Hit

**Les Lawry-Johns**

After another long and weary day of mending TVs then watching TV in the evening we at last got to bed and dropped off into a deep sleep. We were awakened at one o'clock in the morning by a loud crash. I leapt out of bed and rushed down the stairs shouting at the top of my voice, informing the window smashers that they were born of unmarried parents. Such was the speed of my descent (naked as usual) that the smashers fled before taking a thing. I was hardly in a fit state to run out into the street so, after taking note of which window had been smashed, I ran back upstairs to pull my trousers on (having rung the police). There followed the usual clearing up operation, which was especially hard on Honey Bunch because she'd worked so well and long decorating the windows with Christmas decorations. They'd looked nice, very very nice.

We cleared up the mess and boarded the window (the small one this time), had a cup of tea and returned to bed, laying awake for a long time as we half expected another crash. I was plotting ways of laying a grid inside the windows connected to a 25kV e.h.t. supply. Something less I decided, in case I should hurt myself. Why anyone finds it worthwhile smashing the windows beats me: we always take the expensive bits out every night. They must do it for fun. So the grids will go up. I wonder whether that will stop them? Somehow I doubt it.

## That Evening

We felt a bit depressed the following evening so we went next door to the Coach and Horses for a drink. Sylvia the landlady served us and she and HB chatted for a while about knitting patterns. Then HB went over to the fruit machine and lost some money while dreaming about making some. I sat at the bar and dreamed, waking with a start as I heard myself snoring. Just then Tony walked in. He's an avid reader of this magazine and has been for some years.

"You're slipping Les" he greeted me. I sat up straight and wiped the sleep from my eyes. "no you fool, not off your stool, I mean your articles are getting a bit dreary. You've lost your zest, your get up and go if you know what I mean."

I nodded miserably. "I know what you mean Tony. My get up went down and my go just went – some time ago. Sorry, very sorry."

Tony looked a bit mystified, then tried again. "No Les, we know you're getting on a bit and probably feel a bit jaded. But it used to be fun reading your adventure stories – how you won the Battle of Britain single handed, how you fought the Red Baron in the first war when he said your Camel was soppo, how you passed wind through the Great Wall of China. We never have any of that old tripe now. What's happened?"

"Well the editor didn't think he should print the last one about when we got lost up the Yukon and bumped into Eskimo Nell. He said it was too rude and I think he was right. I mean who wants to read what Dead Eye Dick had in his hand?" Tony gave a cough and turned away as

Sylvia approached with the drinks. Sylvia doesn't like naughty songs and always looks daggers at me when I start to sing the Lobster Song. We all have to be on our best behaviour when Sylv's around. That's why Dave sends her upstairs sometimes, when the boys start telling each others' fortunes.

So we had a couple and called it a day, HB having scooped up all our change and bunged it back into the machine that kept telling her to leave the combinations to it to decide. But she wouldn't listen.

## Next Day

Next day there was a long procession of idiots who each knew exactly what was wrong with their sets and didn't like it when I told them they were wrong. One chap said his fuse had gone. I spent some time proving that it was the line output transformer that was blowing the 800mA fuse in his G8, then he said he didn't want it done anyway. I helped him out with the set and he then turned and said he felt he should give me something for my trouble. So he pulled this orange out of his pocket and handed it to me. I gave it back saying I don't like oranges. Then he pulled this ten penny piece out. I told him to b...r off. Is it any wonder I get dispirited at times?

Look what happened when a chap brought in his ITT CVC9 (20in. version). He complained about the focusing and said he thought it was the tube. I chided him for thinking such a thing. "The smaller 20 and 22in. tubes in these sets last forever." I mean, just everyone knows that the resistors in the focus network change value and that if it isn't the one on the tube base it's one of the 4.7M $\Omega$  ones in series with the focus control. So I checked the 2.2M $\Omega$  resistor on the tube base panel and it was all right. I took off the line output stage cover and checked the two 4.7M $\Omega$  resistors. They were all right. So I changed the focus VDR itself and the decoupling capacitor for good measure. No change. I thought the resistors could be telling lies so I fitted some new ones. All to no avail and the voltage was spot on. I didn't believe the meter – it's played tricks before – so changed the tripler. The focus was as bad as ever and I had to conclude that the tube was indeed at fault.

"I thought you said the tubes last forever . . ."

## A Lecture from Les

Having proved that I know nothing about ITT sets I'll now give you a bit of advice which you probably don't need.

Whenever you get a CVC32 or one of that ilk in for service for whatever reason, always check the small subpanel over the top of the scanning coils. Take it out (unclip it) and turn it over to check the contacts on the print side. You'll be glad you did (well I'm always glad that I do anyway). There's always one contact at least that's about to cause trouble. End of lecture.

## Finale

We have a couple of large blocks of flats opposite the shop and I'm often asked to "pop over" to check a TV set or something. They never know the make or model number so if I do go I have to lug quite a load of stuff with me in order to be reasonably sure of doing the job. By the time I've walked over to the flats, gone up to say the seventh floor, then walked along the corridors I'll prob-

ably be feeling a bit puffed. You repair the set, replacing maybe a fuse and a transistor, then test it and line it up. Then you pack your kit bags as it were and prepare to leave. The lady has a pound note in her hand and is saying

"I must pay you something". You don't want to offend, so you decline the reward and leave. As you go out of the door you hear her call out "if we get any other little jobs I'll give you a shout" . . .

## Letters

### DISCO-LIGHT EFFECT

Les Lawry-Johns mentioned a disco-light effect in the November issue. I've seen similar effects several times, due to loose shadowmasks in tubes. The mask seems to become partially detached within the c.r.t. and gets too hot. This leads to expansion with loss of purity etc. due to movement of the mask from its correct plane.

A tube with this fault will sometimes give a perfectly good display when the set is switched on from cold, going berserk as the shadowmask heats up. A similar effect can be produced by placing a shadowmask from a scrap tube against the face of a good working c.r.t. and moving it about. By keeping the mask still, the individual triad structure of the phosphor dots can be seen. To date I've seen this fault only in delta-gun tubes.

M.J. McHugh,  
Hednesford, Staffs.

### N1700 TIMER RECORDINGS

It doesn't seem to be too well known that to make an unattended recording of more than two hours on a Philips N1700 VCR all one has to do after setting the timer is to make sure that the time setting switch is not returned to the "lock" position. In any other position the recording will be started by the electronic clock and will continue to the end of the tape, being switched off by the stop foil. May I add that the speed reduction modification given in the April 1983 issue of *Television* works very well.

E.A. Evans,  
Taunton, Somerset.

### THE VIEW MASTER

I found Chas E. Miller's vintage TV article on the View Master (December) very nostalgic – I built one of these sets by way of a return to electronics after radio in the 20s followed by a period at University and then war work. Chas has clearly described one of the later models however – I believe there were several. The first appeared in approximately 1946, just after the war, when both Pye and Ekco had 9in. table model t.r.f. sets that sold for about £45. This first model – the one I built – was rather less sophisticated than the one described by Chas Miller. The e.h.t. (7kV) was obtained from a mains transformer instead of being flyback derived, there was electromagnetic focusing, and a full-wave rectifier was used for the h.t. supply. The set nevertheless gave superb results in the area covered by the Alexandra Palace transmitter.

At this time, and for two-three years, there was no question of being able to obtain a 12in. tube – unless you were friendly with someone "in the know". The 9in. size was the order of the day, without internal aluminising (ion burn was very common) and external Aquadag coating, so that high-voltage capacitors were required to smooth the 50Hz e.h.t. The first commercially available receiver with flyback e.h.t. was the Pye B18T, a 9in. table model released in July 1948. The valve e.h.t. rectifier was

encapsulated with the line output transformer in bitumen.

Finally, *Wireless World* about this time designed and described a real DIY television set. In contrast with the View Master, everything that could be made by the constructor was described, even the scan yoke. There was flyback e.h.t. with a voltage tripler that employed metal rectifiers. It was originally a t.r.f. design, but a superhet version followed – very useful for frequency changing as the Birmingham transmitter had by then come into service.

J.B. Haley, Ph.D., C.Chem., F.R.S.C.,  
Fleet, Hants.

### AIRBORNE TV

In the December issue Roger Bunney mentioned airborne TV experiments carried out during the 1960s. A British book published in 1949, *The Television Guide* by Dr. W. Summer, gave details of American transmissions during the 1940s. The Stratovision project as it was called was undertaken by the Westinghouse Corporation, and the pictures of the aeroplane and the transmitter on board indicate that at least the experiment got off the ground. A map showed that virtually all the States could be covered by fourteen aircraft: a 1kW transmitter at 30,000 feet was said to have a service area radius of 400 miles across, giving the same signal as a 50kW ground-based transmitter.

Incidentally, recent discussion of pre-war television may have given the impression that the Americans used the 525-line standard from the start. This is not so: the pre-war system used 441 lines.

Finally a request. I'm assembling a collection of broadcast test card material and have already acquired more than a dozen different monoscope tubes and as many 35mm slides. I'd be pleased to hear from anyone who has items to dispose of.

Andrew Emmerson,  
71 Falcutt Way,  
Northampton NN2 8PH.

**Editorial note:** The effective starting date for regular TV services in the USA was July 1st, 1941 – with 525 lines. Previous services were allowed by the FCC on an experimental basis only. They used 441 lines, though RCA had used 240 and 343 lines for demonstration purposes in the early 1930s. An excellent and very detailed article on the early days of TV in the USA appeared in the March 1982 issue of *Radio-Electronics*.

## Book Note

The second edition of the **Antenna Engineering Handbook**, edited by Richard C. Johnson and Henry Jasik, has been published by the McGraw-Hill Book Company at £76. This sumptuous book contains 1,408 pages and deals with just about every type of aerial, with the emphasis on design rather than installation etc. The material is of US origin, which means for example that in the section on TV receiving aerials the use of 300Ω twin feeder is assumed and US channels are specified.

# Nobody Told Me

**Les Lawry-Johns**

A while ago I commented that no one in this trade ever has the chance to get a big head. No sooner does one overcome an impossible job and start to glow than another presents itself and you're back in the dumps, wondering how you ever had the gall to think you could cope. So often it's a question of a dead set, but where does one start with modern designs?

## Power Supplies

Take the Rank T20 and related chassis for example. They come in and without switching on you check the usual things with an ohmmeter. There's a good chance that you'll score a bullseye right away. The 910Ω resistor (4R16) in the 12V regulator circuit tends to go high in value; the 1Ω resistor (5R8) in the BU208A's base circuit tends to go open-circuit; and the two EW modulator diodes 5D6/7 tend to fail. The drill is to check these items first. Suppose they are all o.k.? You may plug in and find that there's no 200V output from the chopper power supply circuit. This has happened to me several times recently, so I thought I'd dwell on it for a moment.

There are two fuses on the centre power supply panel. The one nearest to you (7FS1, 1.6A HRC) is on the d.c. side of the mains bridge rectifier. You may well find that it has blown and wonder why. As a first step you check the BU326 chopper transistor 7VT7 and find it short-circuit. "Ah ha" you say as you replace it. If you're daft you then replace the fuse and see it blow just like the first one did. The next step is the tedious business of checking all the other components in the area. Start with the two diodes in the overvoltage crowbar circuit – 7D12 (1N4148) and the 27V zener diode 7D13 (BZX79/C27). One or both will probably be short-circuit. You then scurry around looking for a 27V zener diode – naughty boys settle for 30V if they can't find a 27V diode. The two thyristors 7THY1 (chopper drive) and 7THY2 (crowbar) could have suffered and should be carefully checked together with all the associated diodes. If you're lucky you'll have got the 200V back by now. If the tube's heaters don't light up, go on to check the line timebase.

## The GEC C2110 Series

The GEC C2110 series is another old stager with which we should all be thoroughly familiar. Most troubles arise in the line output stage. The BU108 (use a BU208) line output transistor goes short-circuit, taking the 47V zener diode D51 with it; the 1MΩ resistors R607/8 on top of the line output transformer cook up; and the 560kΩ resistor in series with the first anode presets goes high or open-circuit. Once again however the pattern is changing.

We've had several of these sets in recently with excessive e.h.t. due to the h.t. line rising to well over 200V. This will occur if transistor TR701 in the thyristor control circuit isn't conducting sufficiently. The cause is likely to be one of the resistors in its base circuit changing value. The usual culprit is the feedback resistor R706 (470kΩ). It goes high, a replacement bringing the firework display to

a halt. The excessive voltages in the line output stage may have resulted in one of the wirewound resistors on the side of the line output transformer housing springing open after the associated zener diode has gone short-circuit.

## Pinky and Perky

We all get our share of strange customers. I think I get more than my share, but they do give us a laugh now and again.

An elderly couple pulled up outside, in an equally elderly Morris Minor. I heard them arguing away so I went out to see if I could be of help.

"You get in and get one end and I'll pull it out this way."

"No, you get in and I'll lift it from here."

I solved the problem for them and thought the dispute was over. No such luck. It was a 20in. Philips G8. The man was rather small and had a pink tam-o'-shanter on his head. The lady was equally small and wore a black hat with a white feather in it. So he was Pinky and she was Perky and they never stopped chattering (mostly both at once) and arguing.

"The switch doesn't work."

"No it's not the switch because you can hear it click."

"That doesn't mean it's doing its job."

"Shut up and let the man look at it."

So I looked. I could hear the degaussing buzz, so the switch was working. I started at the bottom of the mains dropper, to ensure that the mains a.c. was present here. It was, and was also present at the next tag up. I switched the meter to d.c. and checked the upper section. The set immediately started up – as soon as the meter probe was applied. I thought there was a dry-joint and checked carefully, but there were no obvious ones. Switch off, wait a while, then switch on again. Nothing. Check for h.t. at the upper tags and again the set starts up. I switched off and checked the dropper cold. It was intact. To cut a long story short and to cut out Pinky and Perky's tirade, which continued non-stop, I was called upon to make a decision and despite the fact that I nearly always make the wrong one this time I rose to the occasion.

"Well what's wrong with the bloody thing?" asked Perky.

"My opinion, which in your view may be silly, is that the thyristor has an internal open-circuit which makes when the circuit is disturbed – in this instance by application of the test prod."

Pinky gazed at me for a while. "To me that's a load of old bull."

Perky wasn't going to let him get away with that.

"If you had any sense you'd realize the man knows what he's talking about, which is a damn sight more than you ever do. You just rabbit on and on while saying nothing."

It was time to put my theory to the test. I'd noted that the thyristor wasn't the usual BT106. It was of the BT116 type, though the number couldn't be read. I removed it and transferred the nut, bolt and washer to a new SN4444. With this installed the set came on each time it was asked to. I coughed slightly, straining to hear the thunderous applause that should have been forthcoming. It wasn't.

"Well, will it be all right from now on?" demanded Pinky.

"How the bloody hell should I know?" I snapped, losing my cool at last. "You brought the thing in because it wouldn't switch on and now it does. That's my job



completed. What happens hereafter is up to you."

I put the set back in the Minor and off they went, still nattering away at each other like mad. I reflected on the quiet life that HB and I lead. We are such nice people. If only she wouldn't stir the coffee up so quickly.

### **The Bush BC6004A**

This Rank colour portable was made in West Germany and I wasn't familiar with the circuit at all. As it belonged to the "hire and fire" man at the local builders' yard, and as Don has been helpful to us on occasions, I couldn't say no.

It has full v.h.f. as well as u.h.f. reception facilities, so the tuner is not the run of the mill type. The poor reception with very grainy picture suggested that the tuner could well be at fault, but careful investigation failed to reveal anything amiss. The a.g.c. also seemed to be about

right. The tuner and i.f. sections are of the plug-in type, so I next removed the covers of the i.f. section and carefully checked the input and first stage. This consists of a BF199 transistor (T251) which is followed by a TDA440 i.f. i.c. The voltages around the transistor didn't seem right but a replacement produced no improvement. I repeated the voltage checks and injected signals to see where they went missing. The trouble still seemed to be in the first stage, and as I was probing around a small item caught my eye. It was a tiny 4.7k $\Omega$  resistor with the wire ends doubled up ready for insertion into the printed board – but it had never been fitted. It had just layed there inside the i.f. unit, doing nothing until (I presume) it had got jolted and upset things. A look at the circuit revealed that it was part of the tuner a.g.c. circuit, but as the tuner a.g.c. voltage seemed o.k. I simply removed it. This restored normal operation, but I won't tell you how many hours were spent before the errant resistor was spotted.

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## **Electronic Speech for TVs and VCRs**

**David Botto**

Pete pushed the workshop door open and turned on the main power switch. A babble of electronic voices immediately greeted him.

"Good morning!" "It's 9.17 a.m." "Attention please!" "Danger! Smoke!"

"Quiet" yelled Pete, and the voices stopped as built in sensors in the TV sets and VCRs detected his voice. It was well past the time to start work, so Pete picked up his much-used digital meter – he refused to use the new talking multimeter the Boss had ordered from a rep in a weak moment . . .

No, this is not the start of a futuristic story, merely a pointer to what TV engineers may have to put up with in the not too distant future. Thanks to the recent development of very low priced speech generating i.c.s, TV sets, VCRs and perhaps a whole host of domestic appliances will soon be talking electronically. They'll inform, remind and warn in a natural sounding voice, using inexpensive circuitry built into the equipment.

Before discussing electronic speech synthesis it's useful to know how human speech is produced – being able to talk is something we tend to take for granted, but it's quite a complex business. A column of air is sent up by the lungs, pushed up by a dome-shaped muscle called the diaphragm, the lungs acting as a sort of bellows. This air goes through the windpipe, entering the larynx – the voicebox or Adam's apple – in the middle of the throat. There are two small folds of muscle inside this voicebox – the vocal chords – which open and shut to let air in and out (and also to stop foreign objects getting into the lungs). As air is forced from the lungs the vocal cords vibrate, producing sound, the speed of vibration controlling the tone.

After passing through the larynx the air enters the upper part of the throat, going on into the mouth and nasal passages. Overtones are added, and the roof of the mouth, the teeth, gums, jaw and lips break up and control the sound waves so that the listener hears sounds he can understand.

### **Speech Synthesis**

To synthesize speech calls for an entirely different

approach, but one that takes into account the way in which the human voice works. Integrated circuits can do the job easily, cheaply and reliably by combining the component parts that go to make up speech. The basic unit of speech is the phone, a sound made by one's vocal system. Alter a phone just a little and you get an allophone. Bring together phones and allophones and you've the sounds that enable one word to be distinguished from another: these sounds are called phonemes and are composed of many different frequencies.

There are two basic methods of electronic speech synthesis. The first uses digitally stored words and/or phrases. The second stores phonemes or allophones which are combined to produce words and sentences. This second method enables any word in almost any language to be formed – and is thus ideal for robots with a lot to say! For talking TVs and VCRs however the former, stored words/phrases method is more likely to be used: the number of words is limited by the storage method, but is still considerable.

The cost of electronic speech was until quite recently prohibitive so far as domestic equipment is concerned. Now however several large-scale speech processor i.c.s have become available: they contain extremely complex circuitry yet cost only a few pounds. Some examples will be considered in a moment.

An input code such as a binary number is fed to the synthesizer i.c. which then selects the required word/phrase or stored speech element from an internal or external read-only memory (ROM). It then processes the ROM's output before passing this to an electronic circuit that models the human voice tract. The output is amplified and then fed to a normal loudspeaker. The synthesizer could be controlled by switches for single words/phrases or single parts of speech: in practice control is done by a microprocessor or microcomputer.

### **Synthesizer ICs**

The National Semiconductor MM54104 speech processor i.c. is designed for use with specially designed speech ROMs – type MM52164 – and is housed in a 40-pin pack.

The keyboard is also shown as having a two-way data flow. This is because the keyboard operates in the same way as many remote control handsets and VCRs. If there are say 64 keys, we send out eight addresses and the data comes back along any one of eight lines when a key is pressed.

The cassette port is included so that a cassette recorder

can be used to record data and programs and, on playback, transfer them to the RAM.

Next month we'll look at the operation of the CPU in detail. This will also be helpful in connection with the microcomputer i.c.s used in VCRs etc. It's always much easier to repair something when you understand how it works.

## ***Tiny Tim's New Shoes***

***Les Lawry-Johns***

Tiny Tim eventually got the new pair of shoes he needed so much – from Tinker Bell, for Christmas. So on Boxing Day he put on his new pair of shoes and kept them on. That evening he had a few drinks (quite a few) and as the hour grew late he indulged in dancing with a young lady (a member of the family you understand). Whilst demonstrating his amazing dip and reverse he somehow stumbled and fell, bashing his chest on the bar. So Tinker Bell took him home and he managed this feat without falling down. When he got upstairs he did fall down, across the table, hitting his chest in the same place. So Tinker Bell guided him to the bedroom and as he was undressing he sort of stumbled and fell on to the arm of the vicar's chair, again on the same rib.

In the morning he couldn't cough or blow his nose but he did sneeze once and that very nearly killed him. He was very cross and vowed not to wear new shoes any more. It still hurts.

### ***The Puzzle***

Despite Tim's injuries he managed to carry on almost without complaint. It was business as usual and he made a muck up of only one or two jobs. Until this fellow came in carrying a 14in. Philips portable that is. Tim thought he recognised it as a KT3 and felt confident he could stick in a new 4.7Ω resistor without too much trouble. So he tried to show off.

"Hang on a moment sir, won't take a second."

His doubts grew as he turned the set around. Why was there a three wire mains lead (no plug)? He removed the rear cover and noted a couple of tracks blown open on the right side lower print, then released the top catches and lowered the panel to get at the lower right side of the power board. On removing this he was stunned to see that it was severely blackened and had several tracks blown open. He looked at the control board next to it and noted that this had also taken a pounding. He looked at the man who'd brought it in and confessed that it wouldn't be a quick job and could well turn out to be expensive.

The man showed no surprise. "That's what I thought you'd say. I don't want to spend much on it. If you like you can keep it for spares."

So Tim was left with this bundle of mystery and resolved to solve it when time permitted.

When he returned to it later he started by repairing the power board, replacing two of the diodes in the mains bridge rectifier, the 4.7Ω surge limiter resistor and the 12V zener diode that had gone short-circuit. He then cleaned off and remade the tracks. The control board needed quite a bit of attention – two transistors, a diode and track repairs. The main board also presented a problem, with tracks blown and two diodes at the top short-circuit. There were lots of other faults to clear up,

all apparently due to the original big bang.

Tiny Tim looked at the green earth lead suspiciously and checked that it did indeed go direct to chassis. Also that the brown and blue leads went direct to the power board, i.e. there was no on/off switch. Rightly or wrongly he concluded that the set had been removed from an entertainment centre which must have featured a central bank of switches and a mains isolating transformer. So Tim removed the green lead altogether before testing the set, which now worked perfectly. He put it on one side, intending to show Tinker Bell how clever he'd been when she returned from a visit to the daughters.

### ***Zacharius***

When she did return all thought of the set left his mind. This was because she came in with a large puppy Alsatian on the end of a choke chain. She'd apparently had quite a time trying to control him.

"This is Zack" she explained. "When he grows up he'll guard us and we'll be able to sleep at nights. The trouble is that he's a bit unruly and I sound soppy saying Zack back or back Zack. We'd better change his name."

The outcome was that he came to be known as Zeb. He's quite a handful, being only four months old, with boundless energy and a fear of being left on his own for a second or two. Tim's ribs have taken a battering – the cat doesn't like him either.

### ***Sans Switch***

When Tim finally showed Tinker Bell how clever he'd been with the Philips portable he was a bit disappointed with her reaction.

"Why can't you switch it off?"

Tim was annoyed with this lack of appreciation.

"The set incorporates this latest safety factor, so far present only in this one set. There's no flimsy on-off switch. When sets are not in use they should be disconnected from the mains supply completely to ensure that they are safe."

Tinker Bell was not impressed. But the more Tiny Tim thought about it the more convinced he became that he was right. He resolved to write a letter to the editor of *Television* magazine suggesting that no sets made in future should be fitted with an on/off switch. . . .

### ***Thorn 1600/1615 Chassis***

Tim is also getting angry with the daft 24kΩ resistor (R5) used in these 20 and 24in. monochrome sets to feed the tuning voltage supply regulator. Surely a resistor connected between a 185V h.t. line and a 30V line should be rated at 2W or more for long-term reliability?

# Driven to Drink

**Les Lawry-Johns**

A smart grey Honda pulled up outside. A rather flash female jumped out and pranced into the shop, immediately filling it with French perfume or something.

## **Mrs Upyew**

"Oh darling, will you be a pet and get my box out of the car for me?"

I went and dragged the ITT CVC32 out of the car. I then brought it in and put it on the bench while she prattled away.

"I'm going into town for an hour, so I'll collect it on the way back if it's done by then. I don't mind spending a fiver on it if necessary."

I picked the set off the bench and started to put it back in the car.

"Oh darling, I was only joking. I'll pay whatever it costs of course, but fuses don't cost all that much do they?"

I continued to plonk the set on the back seat.

"Oh you are an old grumpy today aren't you? Please do it for me, I'll be so grateful – you'll see."

So I got it out again and started to prepare the sheet.

"What name is it please, madam?"

"Upyew darling."

So I wrote Up You Darling. She screamed with laughter. "No no you naughty boy, the name is Upyew, the darling was meant for you sweetheart."

To shorten the story a bit she then pranced off to her car which refused to start. So I had to push it after telling her to put it in gear and keep her foot on the clutch until we picked up a bit of speed. Then off she went and I returned to the CVC32.

## **The Nightmare**

It was tripping. Going hump, hump. So I switched off and disconnected the tripler. I then checked the line output transistor which was short-circuit. With this replaced and the tripler still disconnected I switched on again. The set still tripped and this time there was a whisp of smoke from the lower part where the BSX21 chopper driver transistor lives. The set became silent and I found the BSX21 short-circuit. With this replaced the set remained silent and I had to replace the TDA2640 chopper control i.c. As a precaution, the h.t. feed to the line output stage was disconnected before switching on again. When I did switch on the set didn't trip and some pretty red LEDs lit up to show that the set was happy enough without the load presented by the line output stage.

The items connected to the line output transformer's primary and secondary windings were checked and found to be in order. So a new transformer was fitted and, fool that I am, I reconnected the tripler before switching on. When I did this the set continued to trip and then gave up – the BU126 chopper transistor was short-circuit. With a heavy heart and gloom all round I replaced the transistor and this time disconnected the tripler before switching on again. Everything was just fine, i.e. no tripping and the LEDs glowing merrily. A new tripler was fitted and I now had a picture – with severe EW distortion. The BD238

diode modulator driver transistor was short-circuit. By now I was in a filthy temper but to complete the job I replaced the BD238. This enabled me to adjust the presets and a really good picture was obtained. I wrote out the report and bill.

When Mrs Upyew returned she pranced in as usual.

"Set ready darling? I hope it didn't cause you too much trouble."

I gave her the bill and the smile faded. She paid by cheque and I put the set in the car for her and not a word was said. Fortunately the car started first time and off she sped, a very unhappy woman. So much for her fuse. Oh yes I forgot to tell you, I removed the small panel over the scan coils and found the usual dry-joints there.

## **Elephants**

A well known component firm has for its trademark a small elephant leading a large one, the latter's trunk holding the tail of the small one. I've often wondered about the origin of this and when Stan Westover called last week I asked him about it.

Apparently the firm's two founders started it by combining their separate firms – South East Electronics and Midland Electronics. Naturally they decided to call the firm South East and Midland Electronics. When they came to register the name they were sternly told that this could not be done as there was already such a firm. So they said they'd just use the initials, SEME. No they were told. SEME stands for South East and Midland Electronics which is already registered. "Oh no it doesn't" they replied, "it stands for Small Elephants and Mammoth Elephants." So now you know . . . I think. And I'd always thought it was to do with See Me.

## **Fooled**

This one made me blush. A chap I know quite well – he works on the river – brought this small ITT (STC) portable in. It was a VC11 with valves and things like that in it. I had quite a tussle, restoring full width and height, repairing the i.f. stages, etc. The aerial was then connected to the u.h.f. socket and the set switched to 625. I next discovered that it didn't have a u.h.f. tuner. So I switched back to 405, plugged in the v.h.f. aerial and tried to tune in Channel 1 or 9. I spent some time on the tuner before realisation dawned on me that it had all been in vain. The signals weren't there any more.

When he came back to collect the set he told me it had been out of commission for a few weeks. It had gone wrong just before the shut down.

## **Confusion**

I've been in a state of confusion for some time now. I fear it's getting worse, and anyone who brings anything to me expecting to find efficiency must be living in cloud-cuckoo-land. It took me hours last weekend to prepare a car radio (Radiomobile 80) for positive earth use just because the polarity turn key was missing and it had been wired for negative earth and the AD149 output transistor had gone short-circuit and blown its emitter resistor. You see, Dave collects vintage cars and everything has to be right. Not Dave from the pub, Dave from the garage down the road. He often sends me car radios to fix. Some keep their dial lights on when they are switched off – anything to worry me . . .

obtained. Azimuth and tilt are then adjusted as before.

The thing to remember when adjusting a new head is that the final alignment will match that of the machine on which the tape used was recorded, so be certain of the alignment of the machine whose tape you use for the

purpose.

Finally X adjustment. On some machines this is a conical screw, on others the base plate is mounted via slotted holes. In either case centre the tracking control and adjust for best picture.

# Sid's Secret Weapon

Les Lawry-Johns

Our old friend Sid popped in the other day and left a Ferguson 3787 with us for repair. "No hurry Les, I'll be back on Saturday." Since this gave me four days I agreed to have a go, despite my in-built fears of these Nordmende made colour portables that have given me so many hours of torment in the past. I wish an expert on these horrors would write an article for us outlining the pitfalls to be expected when idiots like me try to fumble around in them in the dark. Can you hear me someone out there? . . . help!

I removed the rear shell, loosened the two wing nuts and lowered the chassis. The blue line output transformer at the bottom right caught my eye. It didn't look right. I decided to switch on however to see what would happen. To my surprise the set started up, but in a half-hearted way. I felt the top of the 4-7 $\Omega$  surge limiting resistor RA05: it was stone cold. When I'd switched off I found that it was open-circuit. The set had been trying to work via the soft-start circuit, which was why RU05 (680 $\Omega$ ) was hot and bothered. So I fitted a new surge limiter and tried again. The sound came on but the tube's heaters didn't glow: the h.t. was correct but all the line output transformer derived voltages were low.

I looked at the transformer again and realised that the top half of the core was missing. I'd a suitable old transformer with a similar core so I stripped it down: the core fitted nicely and I glued it in position. Everything then seemed to be in order. A BBC-1 picture appeared and looked good. It stayed on until I pressed the second button for BBC-2. The set then immediately shut down.

I switched off and tried again after a few minutes. The set came on for a few seconds then shut down. I removed plug II, the feed to the tuner control unit, and tried again. The set now came on, but without any picture or sound of course. There was plenty of noise however to show that the set was willing. It stayed on like this for an hour. Then I replaced plug II and it immediately shut down. So I removed the tuner control unit and checked just about everything. Finding no faults at all I refitted it and tried once more. The set now came on, but on switch position five – and wouldn't be budged. It seemed as though the SAS590 had taken exception to my probing. After fitting a new one the set came on, on channel 1, and didn't object to changing channels. I felt relieved and left it on for quite some time.

I thought I'd disconnect the aerial and let it play away to itself. The act of disconnecting the aerial resulted in the set shutting down and this made me very angry.

I decided that the set was working in too sensitive a condition and studied the circuit at some length. Perhaps if I adjusted the set-e.h.t. control RZ13? I did so carefully, for 27V at the slider. After doing this the aerial could be removed and channels changed at will. "Why didn't I do that in the first place?" I scolded myself.

The set behaved itself until Sid came to collect it. He

phoned yesterday to say that it works o.k. until the aerial is plugged in, then it shuts down. He'll be bringing it back in as soon as he has a chance. Back to square one . . .

## The Quiet Life

When the Nordmende had departed life settled down for a few days to a more peaceful run of routine jobs. You know the sort of thing:

"You put a new element in my kettle last week and now it's burnt out. Surely these things are guaranteed?"

"Yes madam, if they are automatic. The one you had wasn't, and you did opt for the cheapest one without a cut-out. If you let it boil dry and cook up you can hardly blame the makers, or me."

The Thorn 9000 which had a new SKE diode (the one in series with the Syclops transistor) fitted six months ago and now has a tripler arcing to the frame. "I thought all work was guaranteed for a year."

Not all customers are unreasonable however. Some are quite understanding. Mainly men, but some women are, especially when you tell them you have a stiff leg (the remainder of this passage is censored – editor).

## The Philips CTX-S

We seem to be getting a fair number of Philips sets fitted with the CTX-S chassis in lately. They are nice little sets with only a few common faults. Probably the most common, as with the KT3 etc., is failure of the 4-7 $\Omega$  surge limiter in the power supply. One came in the other day however with the 300V supply present right up to the collector of the BUX84 chopper transistor.

The chopper drive circuit uses discrete transistors, so fault finding is fairly straightforward. The driver transistor is a BF422, a small 250V npn video type. It had failed. I prefer to fit the more beefy BF337, but it's essential to remember that the base is in the middle with this type, so it must be turned to present the base at one end as marked on the print. Provided this is done and plenty of clearance is left for the body (collector) more reliable operation is assured without the need for a heatsink.

These items, the BUX84 and its drive arrangement, occupy the front right side looking from the rear and are easy to get at as the panel slides out once the rear cover is removed (four screws). Since the lady who'd brought the set in had been told the repair would be difficult and costly she was very happy to have it back in two hours.

## Haunted . . .

What a contrast to the Nordmende that continues to haunt me. I'm sure it's only a simple adjustment but I did set it up according to the manual, honest. When it comes back I'll set it up according to me, so there . . .

# Big Foot

**Les Lawry-Johns**

I thought I was the only one here who put his foot in it at least once a day – often more frequently. Now there are two of us. That puppy Zeb has grown rapidly and is now rather large. He'll get bigger – if he lives that long. Honey Bunch tried to bash in his brains (?) the other day after he'd ripped her prize plants out of the ground and then pulled them to pieces. I tried to act as peacemaker and ten minutes later was ready to kill him myself. He'd chased the cat through the shop and she'd leapt up on to a shelf and knocked off a record player just as the owner called to collect it.

Now that the weather is warmer I get a brief respite because he stays outside on a long lead for at least five minutes during which I can get just a little work done. To be fair though that's all we seem to be getting lately – just a little work, not really enough to pay the bills. Charge more they all shout. No. Not when there's not much work coming in. The time to charge more is when there are plenty of jobs and you can afford to lose a few.

What am I rabbiting on about? Sorry, it's the dog you see, he's having an effect on my nerves. When customers try to talk to me I stare past them with my face twitching and they think I'm going funny. Of course I'm not . . . I'm not . . . I'm not.

## **The CTV14R**

Like the chap who brought in the Fidelity CTV14R. "It didn't cost much to buy so I don't want to spend much on having it repaired. Not more than say fifteen pounds."

So I took it in, hoping for a nice dry-joint. What a hope. The fuses were intact and there was a high voltage at the collector of the BUX84 chopper transistor. There was the same voltage, instead of 120V, at its emitter. It was short-circuit. So I stuck another one in. Switched on and there was a funny tripping noise as the h.t. started to rise and then collapsed. I was afraid that the line output transformer was at fault but didn't want to think about it. I checked the line output transistor carefully and then the diodes fed from secondary windings. One (D34) was short-circuit. Glory be. Now normally I would have checked around to see what had killed it, but I had to put my big foot in it. I put another diode in and of course the result was the same tripping. The reservoir electrolytic has shorted I thought, but although a short was found to be present it wasn't the capacitor's fault. When I isolated pins 2 and 5 of the TDA1170 field timebase i.e. the tripping stopped and a nice bright white line appeared across the screen to show that the set was happy to work without the chip to upset things.

So I looked for a TDA1170. I looked where they should be and then where they shouldn't. Perhaps I couldn't see properly? I looked at my glasses. They were smudged. I wiped the lenses and one broke away from the frame as the screw snapped off. Not my new glasses, my old ones – as you'll recall I can't wear my new ones as I can't see close up with them. I even have to take my old ones off to see really close. I knew I didn't have any screws small

enough so I had to stick a piece of wire through the metal frame and solder both sides as I'd done when the lens at the other side broke away long ago. That's why I got the new ones I can't wear. I still couldn't find any TDA1170s however.

"What's wrong?" asked Honey Bunch, who was playing ball with the dog.

"I can't find any TDA1170s love, even though I've cleaned and mended my glasses."

"Perhaps you've used them all."

"If I'd used them they'd be on the order sheet."

So I looked at the order sheet and they were on it. Then back it came in a blinding glimpse of the obvious. The Normende. That's where they went, together with the 630mA fuses. So I whipped a TDA2600 off the shelf and dashed down to swap it with Don and Ray.

"Ah Les" they greeted me. "Glad to see you. You don't happen to have a spare TDA2600 up at your shop do you? We're right out what with all these G11's gobbling them up." So I produced the TDA2600 from my pocket and they were astounded. I modestly looked at the ceiling and then at the teapot.

"What do you want in exchange for it?" asked Don.

"Nothing really, but I'll take a TDA1170 if you like."

So after joining them over a cup of tea (they don't have whisky down there) I nipped off carrying my precious chip which completed the Fidelity repair when fitted. The heatsink is a pest to get off but nowhere near as difficult as the one on the Normende. Perhaps it's my Weller soldering gun that's getting old (tighten up the nuts you fool).

## **Mack and Millie**

These very nice people are old friends of mine and live not too far away in a select area where not very much happens except when their grandchildren visit and all hell breaks loose. Mack had phoned to say that their 26in. G11 had broken down. Their house was on the right as I drove up so I pulled over and ran the nearside wheels on to the path outside their gate and switched off the lights. Now Millie is a local magistrate, and when I went in she was going on about thoughtless motorists parking on the pavements all over the town. After exchanging the usual pleasantries I got on with the set and found a funny fault in the power supply. To save time I nipped out to the car to get my spare panel and was back in a flash.

"My God that was quick" commented Millie.

"Well I've parked on the pavement just outside" I admitted.

"YOU'VE DONE WHAT?"

"See you in court Millie."

## **The Estimate**

A chap had left an ITT CVC20 and a message to the effect that £25 was his limit. After quite some time it transpired that the tripler was faulty and that the line output transformer was overheating with the tripler disconnected. After replacing the BU208 and fitting all new parts (I was curious) a blank raster with just a shadow of a picture was resolved. The sound seemed to be o.k. but the contrast control had no effect. Tests cast doubt upon the TBA560 but replacing this merely produced an overbright raster with no signal (vision) at all. At this point I removed all the new stuff and carefully replaced all the faulty items. I should suffer. He was most upset when given an estimate.

# Strangers in the day

**Les Lawry-Johns**

I could see that she had a chip on her shoulder the moment she walked in carrying a small Grundig portable (not colour I was glad to note). Despite the fact that I was breaking my heart over a Philips G11 power supply panel she plonked the portable in front of me and let loose.

"I've had this set repaired three times in the past few weeks and now it's gone again. No doubt the same thing."

"No doubt" I growled, "which is why you should take it back to the repairer and beg him or her to have another go instead of lumbering me with the thing."

I could see her change gear, the way they do when they see that a change of tactics is required for them to get their own way.

"I've given Quick Fix every opportunity to do the job properly and they've signally failed. I've been told you're good and not expensive . . ."

"That's right" I couldn't help saying, "I'm good for nothing."

She didn't even smile but went straight on ". . . so I thought I'd bring it along to ask your opinion."

I gave up on the G11. "All right, leave it with me and call back tomorrow. I'll just take the name before you go."

"Miss M. Lott - Mona Lott - from Park Avenue."

I wrote down Miss Moanalot and left it at that.

Off she went and I returned to the G11 power supply. I'd checked every transistor in situ and everything else in sight and was now down to taking out each transistor and rechecking it in isolation. T4086 (BC158) in the excess beam current protection circuit proved to have a reverse leakage of some 3k $\Omega$ , and on fitting a replacement the wanted 150V appeared at the h.t. fuse. It's fortunate that these boards can be checked on the bench with only an a.c. supply fed to plug B - one side to pin 1 or 2, the other to pin 4 or 5.

Having disposed of this minor irritation - several hours of sweat due to my stupidity - I turned to the little Grundig (1230GB) where I proceeded to make the same sort of mistake I'd made with the G11. As the fault appeared to be lack of line drive I made a start by checking the supply to the line driver transistor. It was present though a little high. This was to be expected since the line output stage wasn't working, i.e. there was reduced loading on the 11V rail. This was confirmed by the tube's heater, which was glowing a little too healthily.

I switched off and checked the line driver transistor - base to collector, base to emitter - watching the meter's swing out of the corner of my eye. It seemed to be o.k. so I chased around getting nowhere.

I switched on again and checked the voltages in the line driver stage, noting that the transistor's collector was loaded by only the primary winding of the driver transformer (no feed resistance). Raised eyebrows accompanied the check on the transistor's base voltage. Since its emitter went straight to chassis the base shouldn't be far off chassis potential. The reading was 2V. So I looked at the transistor again. It should have been a BD137. A BC142 looked at me, recently fitted. I whipped it out and found that it was open-circuit base to emitter. The reading I'd got with the transistor in circuit had been base to

collector and then to the emitter via the driver transformer and the tube's heater.

I fitted a BD131 and told the set to make do with that for the time being. It did. The picture was good and the supply line voltage was correct. I must watch the meter more carefully in future. Like you do. The set was left on for a full day, just to be sure.

Mona came to collect it later, paid without a murmur but couldn't help saying "see you soon" as she went. Well she hasn't, so far.

## Another Stranger

Amongst the usual procession of Decca, Thorn, Philips, ITT etc. sets this 14in. Amstrad colour portable turned up. Not a bad little set, of far eastern origin. A quick check revealed that the full h.t. voltage was present but as there was no activity in the line output stage the picture and sound were both missing. Once again I started by making checks in the line driver stage. The set immediately started up and wouldn't stop. So I left it on till the next day.

Once again it refused to start. This time when I checked for voltage at the collector of the line driver transistor there wasn't any. So I checked back to the primary of the driver transformer and found voltage at both ends. The set made a half-hearted attempt to start when the probe touched the transistor end of the winding. Although the joint looked good resoldering it produced instant action with no further hanky-panky. Lucky me. For once.

## Easy Mende

If you remember, quite a time ago I told you of an encounter with Beardy and Non-beardy and how they departed never to return.

Well they did. Carrying of all things a NordMende colour portable of the type that frightens me.

"Get out of here with that thing" I bawled.

"Oh my friend" said Beardy, "let us let bygones be bygones."

"Yes" said Non-beardy, "let the sands show not a ripple."

"Never mind about bygones or the sands, I no mend NordMende."

"It's just a little thing" said Beardy. "It won't take a clever man like you a moment. Very very easy."

"Listen. If I was clever I wouldn't be doing this job."

"Just for old time's sake" said Non-beardy. "It's just a fuse you see."

"All right then" I said very calmly. "We'll just check the fuses."

So I whipped the back off, lowered the panel and checked the fuses. The 630mA fuse in the supply to the field timebase was open-circuit. My mind raced. The chances were that the TDA1170 field timebase chip had shorted or was shorting intermittently. Take a chance. Fit a new fuse and get rid of them.

"You're quite right" I told Non-beardy. "It was just a fuse. It's you who are clever, not I."

"Very good" said Beardy. "How much?"

"Fifty pence" I said, "if I don't see this set again."

"You give guarantee?"

"No I bloody don't. Take the set and sod off."

Do you know, it didn't go off again and each time Beardy walks by he raises his thumb and calls out "very good, very good".

I hate those sets.

# The Vet's Problem

**Les Lawry-Johns**

Not BO but B&O – one that gave me almost as much heartache as that NordMende. If it had been anyone else's I'd have told him to take it back where he got it from, but he's such a nice chap and we do have a dog, a cat and a bird. That bird is definitely female by the way: she doesn't talk but makes a lot of noise. You can't touch her unless she's having one of her freak outs, when she hunches her shoulders, sticks her neck out and babbles away in some strange alien tongue. You can then stroke her till she comes to. She then straightens up and lashes out with her beak. I think it's part of the mating game but she hasn't got one (so far).

## The Spiders

Which brings me to the next horror story. Upon removing the B and O's rear shell – release bottom catches, lift up and off the top tongues – I caught sight of a long brown envelope stuck to the right side of the chassis. Removing the envelope and opening it I found a folded booklet with the circuit details. Inside the fold were the bodies of two spiders which must have been there a long time: one was complete but only the shell of the other remained, no doubt the male who had provided the female with her last meal.

## The Set

The actual repair (having buried the spiders with due ceremony) turned out to be something of an ordeal, as the fault was intermittent. The set would suddenly trip (partially) after it had been on for quite some time, the picture shrinking and then returning rapidly to normal. It didn't shut off to enable proper tests to be made. The power unit is at bottom centre and was removed so that we could try to make some voltage checks. After a long time it transpired that the voltage at the collector of the chopper transistor remained steady while the base and emitter voltages varied, suggesting an overload. I rather doubted this, feeling that the fault was in the power supply itself.

Cold tests were out of the question as the fault was of such an intermittent nature, so we invoked Dante's Law: go where the heat is. This proved valid and the fault no longer occurred when the chopper driver transistor, BD something or other, was replaced. My fading memory suggests that we fitted a BD203 but I could be wrong. I can't check up on it as the circuit is back inside the set, at the vet's home (sans spiders), and I don't have another copy to jog my memory. I've even forgotten the model number and as no bill was presented I can't look up the copy.

## Who's a Ninny?

Next balls up. Who was it who completely stripped down a Fidelity IS100 audio stack system to get at the cassette head in order to solder one wire on, then put it all together again only to find that removal of two screws from the front cassette cover exposes the head and just

gives room to resolder? I won't tell you who it was but I won't do it again.

## Mack and Millie's G11

You remember me calling at Mack and Millie's house, parking on the pavement and getting a rocket from Millie . . .

"Curb crawlers are creepy Les but pavement parkers are putrid."

"Only two wheels, Millie."

"Half a wheel is enough – MORE THAN ENOUGH!"

Well they don't seem to have much luck with their G11. They phoned to report "a white line across the screen".

So along I went and parked in their driveway. I'd taken with me a spare timebase panel (upper left) and some fuses. I checked the second fuse up on the line output panel. It was intact. I checked the soldering to the base of the TDA2600 field timebase i.c.'s holder, and as this seemed to be o.k. I fitted my spare panel. After this I switched on, confidently expecting to see a full raster. Just a white line. Feeling a bit deflated, I tapped the top centre dynamic convergence correction panel. The line flicked to a full raster then collapsed again. Oh dear, I've brought the wrong panel.

I removed the correction panel and examined it closely for cracks and dry-joints. As there didn't seem to be any I refitted the panel and without clipping it down switched on to see if a bit of probing might help to identify the culprit. There was a good, full picture. It wouldn't collapse until I clipped it down. So I unclipped it and told them I'd be back on the morrow with a replacement but that the set would meanwhile be all right as I'd taken the pressure off the trouble spot.

Next day I returned with the required panel and to save time I ran the car up on the pavement outside. I fitted the panel and prepared to depart. Millie said she had to collect her grandchildren from school and came out with me to get her car from the garage.

"THAT CAN'T BE YOUR CAR STUCK UP ON THE PAVEMENT AFTER ALL I'VE SAID!"

"After all you've shouted Millie. See you in court dear."

## The Repair

Back at the shop it took an ohmmeter to locate the intermittently open-circuited track, very near to connector 15A4. A jumper lead was quickly soldered in place to put paid to any further hanky-panky.

## A Solution

I'm fed up with the way this country's going. Everybody seems to be convinced that unless they put up prices, charges, wages – everything every year – they'll be uneconomic and go under. What we need is a universal catch phrase for use at every check out, written on every invoice and bill. Everybody together then, "LESS TEN PER CENT". Salaries, wages, fares, charges. O.K., some won't do it, some perhaps can't. They'll be the unpopular minority. Leave marked up prices as they are, but subtract ten per cent at the time of payment. "Less ten per cent, less then per cent" – can't you just hear it? I can hear the objections: importers etc. But it could be done if we really wanted to. All right we don't. But dafter things have happened.



# The Tantrums of Tiny Tim

Les Lawry-Johns

Tiny Tim had seen the set before but couldn't remember much about it.

"It keeps flicking in from the sides, sort of bowing in if you know what I mean, and we've still got those bars that travel up the screen" said Mr. Crankcase.

"Sometimes they travel down" said Mrs. Crankcase, "but we don't mind that – we're used to the bars."

"Don't worry" said Tiny Tim, "I'll sort it out tout suite."

Clearly impressed by Tim's confidence, the Crankcases departed and left him to it.

## The CVC5

The 26in. CVC5 proved to be a nightmare. Bowing in at the sides on a set fitted with a 90° tube and no EW diode modulator circuit . . . Tim plugged the set into the mains supply and pressed the on/off switch. Being a hybrid chassis, the valves lit up and Tim waited. And waited. There was no cover over the line output stage (shades of Ike Hodge) so Tim held his little neon near the PL509. It didn't light up and he noticed that the valve was getting red hot. So he checked the h.t. supply to the PCF802 line oscillator valve. This was present and the PL509 cooled down. Suspecting the polywhat'sname capacitors in the line oscillator stage Tim changed the PCF802 – this was easier than changing the capacitors. There was no further trouble with the line drive and the e.h.t. rustled up. The picture appeared but it kept flicking sideways and doing all sorts of funny things like bowing in quickly then bowing out again.

Tim's diagnosis was immediate. "Up with this I'll put no more" he said, "it's poor earthing like in the Bush TV181 series, tabs not soldered properly." So he ran wires from the top to the bottom of the chassis and soldered them securely at each earth point. This solved the flicking and bowing and left Tim with the hum bar.

## The Hum Bar

Now we all know what to do about this. Change the AD161 series regulator transistor in the l.t. supply and the bridge rectifier for a start. Tim did all this and more, though the curve that accompanied the hum bar should have told him that the l.t. supply wasn't responsible. He turned to the h.t. lines and found that all the electrolytics had been resoldered – not very tidily.

"I'll shunt them one by one" he thought. He switched off and used a 470 $\mu$ F test capacitor with jump leads and crocodile clips. First he clipped it across the h.t. reservoir capacitor – that couldn't be it because the h.t. was well up, but just in case – and switched on. No change. Why had he switched off? Because the spark might have frightened him (and the dog). Actually he hadn't switched off, he'd pulled the plug out – that was easier. Now that the test capacitor was charged it could be applied to the other electrolytics without frightening him and the dog.

While he was playing around the lower electrolytic he accidentally touched the earth tag with the live lead. This should have produced a nasty spark and made him jump.

It didn't and he frowned a little. He touched it to the main frame and jumped for his life at the loud crack. The dog fled and Tinker Bell came in demanding to know what he'd done to him.

"Sod the dog" said Tiny Tim. "What about me? I nearly jumped out of my skin."

"Yes but you know what happens when you discharge those things. The dog doesn't."

So Tinker Bell went out and Tim was left on his own. Why hadn't the capacitor discharged when he'd touched the lower electrolytic's earth tag? Because it wasn't earthed. He connected the voltmeter to the tag and it said 200V. He took his glasses off and peered closely. The earth track was very thin and was open-circuit. Tim soldered another wire in to ensure that the earthing was sound. But he still hadn't cured the hum trouble.

"If it's not the smoothing, what else?" thought Tim, getting a bit edgy now. Heater-cathode leakage in the PCF802? He'd just replaced that. Fit another one. Still no change. That side ripple had a sort of ghost like foldover in the background, like you get when the tuning is out and the a.f.c. is off.

So Tim operated the a.f.c. switch, which is incorporated with the brightness control. The set went off. The switch had already been in and pressing it had allowed it out (a.f.c. off). So he pressed it in and the set came back on. He pressed the volume control switch – the real on/off switch – and nothing happened. Tim jumped up and down in rage. "Where's the bloody cat" he bawled.

"She's in the kitchen and she'll stay there until you've done your job properly" said Tinker Bell. "She's not here for you to kick when you can't think of anything better to do."

"Someone's taken the mains leads off the volume control and connected them to the brightness control" moaned Tim.

"What's wrong with that?" asked Tinker Bell.

"Putting them on the brightness control will put hum on the picture" said Tim.

"In that case" said Tinker Bell "putting them on the volume control will put the hum on the sound, and anyway why don't you take the mains leads off the controls and tape them up so that the set is on all the time, like on that Philips portable you were so proud of – no set should have an on/off switch you said, they're dangerous."

So Tim did what he was told. He took the leads off the a.f.c. switch and connected them together. He replaced the plug and was rewarded with a cloud of smoke from the i.f. strip. The neutral mains lead should have gone to chassis via the switch. He'd taken off the mains live and neutral leads, also the a.f.c. lead that's taken to chassis via the switch. The net result was that mains neutral was finding its way to chassis via the a.f.c. circuit.

Tim bashed his head on the bench and broke his glasses. He replaced the burnt out 470 $\Omega$  resistor and checked inside the a.f.c. can. There was a scorched resistor but the transistor read all right. He decided to put the lot back in and wired the neutral direct to chassis, refitting the brown a.f.c. lead back to chassis where it

belonged. Then he plugged in, gingerly, and waited.

The picture came on and was lovely. Who said he wasn't a good engineer? – apart from Tinker Bell. Mr. Crankcase came back at five o'clock to pick up his set and was told that in accordance with Tiny Tim's new rules the on/off switch was no longer operative.

"We never used it anyway. We always pulled the plug out." Mr. Crankcase took out the CVC5 and came back in with a CVC20. "Run the rule over this will you Tim?"

### The CVC20

Tim peered into the back and was surprised to see the front control panel lying inside the set in pieces. This upset him in view of the trouble he'd had with the previous set. His little mind immediately rang up fifteen quid. He removed the pieces and put them back together. The control panel now fitted nicely and he had a.c. leaving it and making its way across to the chopper. But nothing came from the chopper.

The driver is often the cause of this but turned out to be o.k. Tim then took out the chopper control subpanel and checked this, that and the other. He could find nothing wrong and was by now feeling fed up. So he locked up the shop, put out the lights and went upstairs.

### The Next Day

Tim was up bright and early next day – in a vain bid to stop the dog chewing the morning paper.

"You're not a dog. You're just a pig and barking machine. We'd be better off with a tape recorder that makes barking noises than with you" said Tim.

"Leave the dog alone" bawled Tinker Bell. "What's he done for you to kick up such a fuss?"

"He only chewed up your competition page. The rest is untouched."

"I'll kill the dog when I come down."

Tim hurriedly taped together the pieces of the page then got on with breakfast.

"Before you start eating, nip down to the newsagent and get me an untorn paper" said Tinker Bell, "I must have my entry in the post before nine o'clock."

What a start. But Tim was soon at work on the CVC20. He put the chopper control panel back, switched on and was surprised to hear the e.h.t. rustle up and the sound boom out. "Fancy that" he said. "The control panel couldn't have been making proper contact. What a clever boy I am". He then wrapped it up and moved it to the soak test bay – the other end of the bench.

### Another ITT

Tim was a bit surprised to see this CVC5 come back since it had been collected only a couple of days ago after he'd restored the colour. He'd spent some time checking around the top left corner of the chassis and had eventually moved down to the chroma amplifier transistors T27 and T28 where he'd found that slight pressure applied to T28 (the small round BF128) would restore the colour. Although there didn't appear to be any poor contacts he'd resoldered the base, emitter and collector. After doing that the colour couldn't be lost: the set had behaved itself on test but here it was back again with the same fault.

This time he dived straight for the BF128 transistor. A cold check revealed that it was non-conductive. So he fitted a BF197, leaving the screen unused, and switched

# next month in

# TELEVISION

## ● USING A LOGIC PROBE

Logic circuitry has been used in VCRs from the start for system control purposes. As a result there are many faults that can be dealt with only on a trial-and-error basis or by investigating the logic conditions. Voltage readings provide some clues but the type of scope used for TV servicing will not usually handle fast changing pulse trains. The simplest approach to this problem is to use a logic probe – a device that will become more useful to you the more you get to use and know it, and will of course also help to sort out problems in TV control systems and microcomputers. David Botto outlines the minimum requirements for a probe for servicing purposes and describes its use in typical circuitry.

## ● COMMISSIONING TVRO SYSTEMS

Many dealers and enthusiasts are probably thinking about installations for satellite TV reception, something that can already provide additional channels in the UK from low-power satellites. What's involved technically and what sort of expense is likely to be involved? Geoff Lewis provides a simple guide in question and answer form.

## ● SERVICING HYBRID CTVs

The Decca Bradford and ITT CVC5-9 series chassis have proved to be able to provide fine pictures over a much greater than originally expected life span. Many are still in use and of course fail from time to time, causing confusion to those engineers who know only solid-state circuitry. Sam Simon provides a quick-check guide to dealing with common basic faults.

## ● TRANSISTOR FIELD TIMEBASE CIRCUITS

While the vast majority of valve field timebase circuits employed the same basic configuration a wide variety of circuit techniques, including class A, B and AB operation, have been used in transistor field timebases. Part 2 of this series describes the operation of these circuits.

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on. He was bitterly disappointed to find no colour. A voltage check showed that there was no forward base bias, a cold check revealing a short-circuit from the base to chassis. This was due to a speck of solder between the base and the screen (unused) print: a flick of the screwdriver blade restored normal operation which lasted for hours on end.

### Tim's Terrible Trouble

Tim thought it was time he paid some bills. So he gathered them all together and added them up. The total frightened him out of his life and as he lay dead Tinker Bell came in to find out what the scream had been for. She kicked Tim in the ribs and he stirred and moaned.

"Get up and get something done you fool. How am I going to get a new dress if you just lie there moaning?"

Tim got to his feet and showed Tinker Bell his piece of paper. "Look, this is what we owe. Now look at this one which shows what we've got. It's not enough."

"You ought to be able to afford me a new dress" snapped Tinker Bell. "If you can't earn enough by mucking about with those daft TVs you could always write about them like that clever Mr. Trundle and that Silly Simon. I've been looking at that magazine and I'm sure the editor is a nice man who might pay you if you could bestir yourself and do a bit of writing instead of keep complaining and trying to kick the cat."

"He might, he might" mused Tiny Tim. "If I could learn to type, that is."

## Line Selector Unit

A. B. Bradshaw

Many lower-priced oscilloscopes have good wideband deflection systems but poor triggering facilities. This is particularly a disadvantage if you want to examine the vertical interval test signals transmitted during the field flyback blanking period – these signals are very useful for monitoring the performance of the TV transmission path.

The unit described in this article has been in use for several years to provide improved TV triggering. It's in two sections, the first of which produces trigger pulses for display of the selected line. The second section was originally designed to provide X-scan and bright-up signals for the Hewlett-Packard 1707 oscilloscope, but if required the unit can be used to provide line triggering only. If the unit is also used to provide X-scan and bright-up outputs the only oscilloscope controls that need to be operated are horizontal and vertical position with sweep magnification by ten times. In this mode the oscilloscope's timebase is switched to "external" – see Fig. 1 for typical connections. When the oscilloscope's timebase provides the X scan the unit provides a selectable line trigger pulse at the start of the line required. Fig. 2 shows the complete circuit.

There are three switches which provide the following functions. The rotary switch S1 selects the line to be displayed. The latching push-button fast-scan select switch S2 is for use with the oscilloscope's sweep magnification  $\times 10$  control, enabling the 2T pulse to be displayed over a large percentage of the scan – thus K rating graticules can be used. The non-latching field select push-button switch S3 is used to give a "field slip" so that the alternate field can be selected. This latter arrangement is a simple solution – the alternative logic circuit technique would

mean that the last line of the field would have to be identified (half or full line). The "field slip" method is not elegant but is very cheap!

### Circuit Operation

Positive-going composite video with an amplitude of 1V peak-to-peak is fed to Tr1 which provides a voltage gain of ten. The output is capacitively coupled to the base of Tr2 with d.c. restoration by means of D1. The sync pulses are stripped off at the collector of Tr2 while Tr3 provides a TTL compatible output for the following i.c.s.

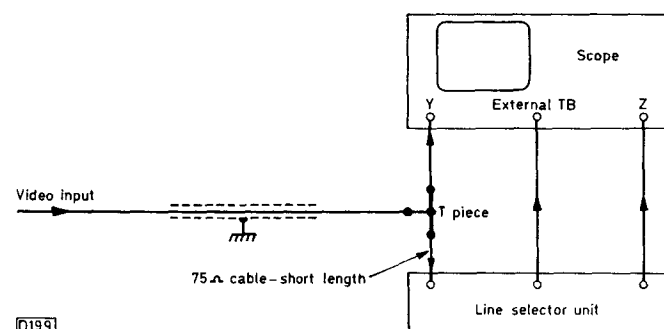
IC1 and one of the gates in IC2 are arranged as a field sync pulse separator, the output being made available at TP2. IC3 is a "start delay" monostable multivibrator which drives IC4. This latter i.c. is used to provide an enable pulse for the following BCD decade counter IC5. Line sync drive for IC5 is provided by IC2b. When enabled, IC5 counts the line sync periods: its outputs are decoded by the BCD-to-decimal decoder IC6.

The decimal decoded outputs from IC6 are brought out to Vero pins on the PCB. These are the basic line trigger pulses used for display selection. IC6's outputs are "loose wired" to a low-capacitance rotary selector switch (S1). Switching the live logic signals in this way is done for cheapness: the method works satisfactorily in practice provided the leads are kept short (2in.).

We now have pulses for each line during the flyback period of interest. The second part of the circuit provides bright-up and X-scan signals. The emitter-follower Tr8 is used to drive the cable bright-up pulse feed to the oscilloscope. The reason for the unusual arrangement in its collector circuit is to provide a measure of protection should the feed from Tr8 become short-circuit.

The selected line trigger pulse is fed to the fast-scan latching switch S2 and to the delay gates IC2c/d. The need for this delay in the fast-scan position will vary depending on the starting rate of the X amplifier in the scope and may require adjustment to the values of C9 and C10 to centre the displayed pulse in the scan.

The selected line pulse is also fed to IC7 and Tr4, via R22/C11 and R23/D6 respectively. Tr4 is used to discharge C13/14. When Tr4 is off, these capacitors charge linearly via the constant-current source Tr5. The resultant voltage ramp is buffered by the cascaded voltage-followers



0199

Fig. 1: Typical scope/line selector unit connections.

# Rocking all the time

**Les Lawry-Johns**

Things are most certainly not what they used to be. People even talk a different language now and I find it difficult to know what they are on about. Take Mr. Flasher for example. He held up a small Philips TX2 portable.

"Thought I'd let you have a look at this for me, right? Picture valve's gone, right? Don't mind paying you to look at it right? I'd do it myself but haven't got the time, right?"

"No. If it needs a valve, tell me which one and I'll sell it to you. I don't want to look at it because it's white and white gives me spots before my eyes and makes me feel ill, especially this soon after breakfast."

Mr. Flasher was taken aback. "Don't know what you're on about, right? What I'm saying is I'll pay you to put a new picture valve in my set, right?"

"I could put a valve in your set but it would just flop around because there's nowhere to fit one. If you want me to repair the set because you've not the time you'll have to leave it here. It won't involve valves because the set doesn't have any, right?"

So he left it and went out muttering about shopkeepers who had no right to have a shop and the government ought to do something about it.

I took the shell off the little Philips set so that it wouldn't hurt my eyes, plugged it in and switched on. The sound sounded but the screen showed only a line down the centre. So I checked the scan coupling capacitor and it had capacitance, then I checked the tracks to the line output transformer and they were intact. Next I wondered.

I checked the winding on the transformer. It was open-circuit. Oh dear, I certainly didn't have one of these little perishers. With enormous dexterity and wonderful presence of mind I removed the transformer and located the break. It could be soldered and it was. Back it went and the set now showed a picture. But it was upside down. My eyes narrowed as I got Mr. Flasher in my sights. So he'd been flashing around. I looked again at the scan coils. They hadn't been disturbed. I looked at the print. It didn't look as though it had been disturbed. Mr. Flasher was a phantom. So I reversed the field scan coils and the picture was the right way up. I could read the news on BBC-2 in the mirror. Something stirred in my brain. I've never been able to do that before, and people always shake hands with their left hand in the mirror. I looked directly at the screen: the picture was back to front. This made me very angry but everything looked all right when I'd reversed the line scan coil leads. I wrote the bill out with amazing attention to detail.

In fact it was Mrs. Flasher who came to collect the set. "I told Harry there's nothing much wrong with the set, right? I said why don't you do it as you're always pulling the radio to pieces, right? But he said 'I don't know about TVs, they've got valves in them'."

I gave up and ushered her out of the door – the dog wanted to go across the road and chase his ball on the green.

Now you'd think a simple thing like taking the dog across the road to play with his ball would be a simple thing, right? No wrong. In the first place he's still a puppy,

albeit a rather large one. In the second place chasing a ball is to him the most exciting thing on earth. As soon as he catches sight of his lead and the ball he goes berserk. Absolutely mad. I'd like to see Barbara Roadhouse calm him down. A choke chain? He's got one and it's high up but he chokes himself to death because he can't get the ball out of his mind.

We eventually cover the few feet across the road to where he knows the chain is coming off and the struggling reaches fever pitch. Whilst I'm trying to remove the chain he hurls himself this way and that until he finally rips my arm off and runs away with it. I manage to retrieve it and tuck it inside my cardigan and throw the ball with my left arm. When he eventually tires we make our way back to the shop, him panting like a steam engine (you can hear him miles away). With him laying on the floor lapping his water because he's too tired to stand Honey Bunch asks "Why did you let him do that? Come here and I'll stick it back on. You'll have to mix the glue though, I can't stand the smell of that stuff."

So I mixed up the epoxy with my left hand and made it good and strong. H.B. stuck my arm back so that I could work properly, then ran her iron over the joint so that it would harden quickly and I'd be able to get on with the jobs.

Puppets heal very quickly you see.

## **The Decca 80**

An old friend then arrived with a set I'm not familiar with: I've done a few, but not many. A Decca CT0802 – 80 series chassis. I plugged it in and switched on. Nothing, or at least I couldn't hear anything. The tube base voltages were present, as was the e.h.t., so I came to the conclusion that the l.t. supplies were absent. I looked for the circuit. A very brief reference in the book that did mention it referred me to the 1977-8 book for full details. I'd just lent that one to Tony. No not that Tony, the other one (sorry Tony).

So I swung up the chassis and took the cover from the line output stage. Everything seemed to be in order but I didn't like the look of the soldering on the l.t. output socket. I resoldered the contacts to make them look better, then switched on. The sound roared out and after a short wait the screen lit up. I plugged in the aerial and the picture looked good. So what? The moral is that if you lend someone a manual for a set you're not too familiar with one will promptly come along. Right?

## **Looking in the Window**

For a long time I've been struck by the fact that nearly every female that walks past the shop turns to smile in at me. Well I can't help being an attractive man. Reliable, sort of, maybe a little staid, sort of . . . I don't know, just fascinating I suppose. After all, those girls can't all be wrong, especially when the sun is shining. Yes that's another thing, they seem to look in more when the sun is shining. It was shining the other morning when I went across the road to post a letter. Coming back I was

surprised to note that I couldn't see inside the shop at all. All I could see was myself . . .

### Fading GEC

It was just an ordinary GEC 2120 or something like that, with the complaint that the picture would fade out for varying periods before returning as good as ever. I had it on test and had left the rear cover on to keep the heat in. After about half an hour the picture faded out, so I whipped the back off to make my definitive tests. These were not required since the picture had returned. So I left the back off. About an hour later the picture faded out and I leapt to the tube base to check the voltages. They were all present and the picture had returned.

I resolved to do nothing the next time. I just looked – at the tube base socket. The tube's heaters faded out. Ah, ha! I checked the heater supply and it was present – and the tube's heaters were glowing normally. So I left the prods connected and lay in wait. The tube's heaters faded but the meter continued to record some 4V a.c. It just had to be pin contact. A thorough clean of the tube's base pins and the socket cleared the trouble, well for a while I suppose.

### More Fading

The next day a similar GEC set appeared. Complaint: picture fades out leaving the sound normal. I resolved to play it cool: meter on the tube base socket to read the applied heater voltage, watch it carefully. After a while the picture faded leaving the heaters glowing merrily. The smile faded and when the meter was switched to the 1kV range we found that all three first anode voltages were missing. There was plenty of voltage at one end of the 560k $\Omega$  feed resistor (R506) on the convergence board but little at the other end. A new resistor restored normal, continuous viewing.

### At the Coach

Having had a couple upstairs, perhaps three or four, we decided to go next door to the Coach. Dave's place. Not Dave from the garage, Dave from the pub. We had quite a few while H.B. tried to beat the machine, and of course Dave kept filling my glass so that I was having twice as much as H.B.

Towards the end of the evening I was dully aware that Tony and Jim had come in. They slapped me on the back to make me growl and I did. So they got their drinks and moved over to H.B.

Now H.B. loves to tease Tony because he blushes so easily. So she set out to make him blush and he did. "Got your black tights on tonight?" she asked, "see you haven't got your high heels on."

Tony went along with it all. "Thought I'd give 'em a rest so's not to make all you girls jealous."

Quite unexpectedly a young man standing by broke in. "If he wants to wear black tights and high-heeled shoes why shouldn't he?"

Tony blushed an even deeper red. "They're only joking" he muttered to the young man.

"Maybe they are" said the Y.M., "but what's wrong with you doing it if you want to? I'm fed up with this place and its narrow minds. I'm off."

As he went out Dick came in. H.B. loves teasing him too. Er, I think we'll leave it at that. Whatever next?

# next month in

# TELEVISION

## ● SIGNAL STRENGTH METER

A snowy picture and an awkward customer can present a difficult situation. Is it the set or the signal, and how do you explain matters? This signal strength meter gives an instant guide to the signal level reaching the set and a handy way of proving to the customer that it may be his aerial that requires attention – after all a meter can't lie, can it?! Useful also for aerial alignment. The meter is simple to build and inexpensive – it uses a commercial tuner/i.f. strip so that only the power supply and meter drive circuits have to be constructed. The unit also provides video and audio outputs.

## ● IC FIELD TIMEBASES

Most TV chassis now use an i.c. for the field timebase, but it's not always clear what goes on behind the various pins and what the peripheral components do. Following our articles on valve and transistor field timebases it's time to get up to date with their i.c. successors.

## ● ELECTRON PATTERN PROGRAM

The various computer programs to provide TV test patterns published earlier this year created considerable interest – at last you can get the micro to do something useful! Andrew Heron has written a comprehensive program for the Acorn Electron microcomputer, providing a blank raster in a choice of eight colours, colour bars, split bars, horizontal bars, vertical bars, a crosshatch, dots, a chequerboard and a centre circle.

## ● SERVICING THE NORDMENDE FC25

The NordMende FC25 chassis was used by a number of rental companies in the early seventies. These large-screen sets still have a modern appearance and with a bit of attention can give years of trouble-free service. Pete Sanders provides a comprehensive guide to faults and fault finding.

## ● TEST REPORT

Eugene Trundle has put the Doranuro desoldering iron through an extended bench test.

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# Wag's Wireless

**Les Lawry-Johns**

Wag's a well known local waterside figure and has been for many years. He's been a customer of mine for nearly as long. Last week something that threatened this long-standing relationship occurred. He brought in his son's music centre, a Ferguson Studio 6.

His son lives down in Sussex (I think) and being very busy he didn't have time to bring it in himself. So Wag went off to collect it, leaving behind the speakers since they weren't suspect. There were complaints about the main amplifier, the cassette and the record deck. So I spent a few hours sorting it out, replacing the output transistors, their emitter resistors and a few other odds and ends. Fitting the test speakers proved that the work had been done well, but it was left on test for some time just in case. Some days later Wag called to collect it, settled the bill and departed in his usual high spirits.

## Wag's Return

The next day he was back. "It doesn't work Lawry, and that's going to upset my son. Didn't you test it?"

"Yes Wag, I tested it for hours. I'll test it again now." So saying I plugged it in and fitted the test speakers. The radio boomed out loud and clear and Wag's face became worried.

"What's them things?" he said, pointing to my test speakers.

"They're the speakers, Wag. It won't talk without them."

"I haven't got things like that."

"No Wag, you left them in Sussex, so you can't test the machine till everything's connected together again. What did you do?"

"I just plugged it in at home and it didn't work at all, but my record player works without those things."

"That's because they're built into your record player, Wag. This hi-fi has spacially distributed sound from separate stereo speakers, see?"

So Wag went off, feeling a bit foolish – like I do several times a day.

## I Never Slept a Wink

A chap carried in a Bush T20. He was followed by an elderly lady who looked a trifle unhappy. He put the set on the bench and retreated. The lady advanced.

"This set was in here three months ago and it went wrong again at teatime yesterday. I couldn't stop worrying all evening and couldn't sleep at all last night. It's not right that it should go wrong so soon after being serviced. I've a good mind to complain to Radio Kent about it."

She was so busy complaining she didn't notice that I'd removed the rear cover and checked one or two points. I quickly replaced the 1Ω resistor (5R8) in the line output transistor's base circuit and refitted the rear cover.

"Well now madam" I said politely, "let's see what's caused you so much sorrow." I plugged it in and switched on. Up came the sound and a few seconds later a good

picture appeared. "Now then, what would you like me to do?"

She stared at it transfixed. "I lay awake all night worrying about it and the moment I get it here it's all right. What's wrong? Will it go again? How do I know it won't go off again tonight? What have you got to say about it?"

"I think it wanted a ride in the car. If it goes again take it for a ride then straight back home again."

"I haven't got a car. My son-in-law brought it down for me because I was so worried. I just couldn't sleep. I've nothing else."

I felt a bit sorry and decided to tell her the truth. "While you were telling me your problems I managed to find out what was wrong and put it right. So you can sleep in peace tonight."

"But how do I know it won't go wrong again? I can't stand another night like last night."

So I took the back off again and examined the scan plug socket which showed some signs of distress. I made that good and checked around the other weak spots on the T20. Everything seemed to be all right so I refitted the back and pronounced everything to be in order.

"I hope it is. Do I owe you anything?"

"I'm afraid so dear. You girls have to pay for my services."

At this point Honey Bunch appeared, towed by Zeb. The old girl screamed.

"Take that dog away. My mother was scratched by an Alsatian once and the scar didn't heal till the dog died."

The old girl called her son-in-law and off they went, vowing not to return to such an unruly place.

## New Chassis

I must admit that some of the newer models in the Ferguson and Decca ranges worry me and probably will do for a while – until I get used to their habits. It was the same some years ago when I sold a customer a Philips G6 rather than a G8, because the latter set was new to me and I was afraid of it whereas the G6 had lovely things like valves in it, things I was at home with. Sounds silly, doesn't it? That particular G6 ended up with a tripler in place of the e.h.t. overwinding and valve rectifier. Why? Economy, that's why. The family I'd sold it to fell on hard times and couldn't afford a new transformer. It still gives a good picture. The G8 and G11 are now old friends to me, but I can't say the same about the G9. This one still worries me a bit. As for the Ferguson TX10, who would have thought the line output transistor is actually the chopper when he first opened one up? Once I'd got used to the layout they just had to alter it to confuse me. Only the siting of the focus unit convinced me that I was still dealing with a TX10. I must get out the books and bring myself up to date.

## GEC 20AX Chassis

This set really had me going. The tripler had decided to burst out of its confinement: the makers had decided to pass a cableform against the bottom corner of the tripler and this is where the insulation breakdown had occurred. It had been allowed to go on arcing for some time before the owners had switched off, so arcing had also taken place over on the chroma panel. In this chassis the group of chroma panels used in the C2110 series was replaced by a single panel and this had taken the brunt of the arcing.

Having replaced the tripler I switched on to see what damage had been done.

The screen was a lovely bright blue, the brightness control having no effect. I removed the blue connection plug from the top of the board and some red and green showed with chroma only, turning to a blank screen when the colour control was turned down. Considerable time had to be spent checking voltages, i.c.s, transistors etc. before an acceptable picture was eventually obtained. I'd have given my left arm for a replacement panel but no one seemed to have one locally. Working through the panel was agony – and all because a cableform had been tied up close to the tripler's bottom corner.

### **Bookie's Lair**

Do you remember me telling you about my bookie friend who lives in a back-to-front house? You go up the drive, through the garage, ring the bell on the kitchen door, go through the kitchen into the hall then into the lounge where you can look out over the front garden and the swimming pool which is normally empty of water. This room contains many items including a bar and a 26in. Dynatron with the Pye 731 chassis, the rear cover being held by ten thousand screws. A door leads from this lounge to another one that also overlooks the front garden. It contains another 26in. Dynatron, this time with a Philips VCR in the top. So the rear cover is held on by fifteen thousand screws. The chassis is the same (nearly) as the one in the set in the other room. I've looked after these two monsters for many years and of late John's been asking me about fitting up-to-date receivers in the handsome cabinets. I've avoided this exercise on the grounds that I'm no carpenter and might damage the woodwork. Apparently he's made other enquiries and been told that a 26in. Sony would fit in snugly. My reply to this idea was not helpful.

"Bugger you mate. If you have Sony sets fitted let them that fits 'em look after them. Not me. I shall not darken your door again."

So the Pye interiors stay inside the cabinets and the sets still perform.

### **The Hitachi Portable**

What's all this about? Well, John suddenly appeared with a Hitachi colour portable which had the annoying fault of intermittent severe top compression that completely ruined the horse racing (office set). As he brought it into the shop I said I'd have a quick look but wouldn't dwell too long on it as these sets frighten me.

I soon found a small daughter board that held the field output stage and discovered that if this was moved to port the raster remained steady. If it was moved to starboard the compression proceeded apace. I didn't like the look of the items on the board so, being the fool that I am, I fitted a wire and spring to hold the board hard to port. It seemed perfectly all right to me so he took it and paid for my highly technical expertise.

The next day he was back. "In the middle of the 3.30" snarled John.

So out came the offending board (soldered in not plugged) and all the connections on it were carefully resoldered (though none looked suspicious). Refitting the board proved that the operation had been successful and John's office is now at peace. Long may it continue. Still, it could have been a TX10 . . .

## next month in

# TELEVISION

### ● RECENT DECCA-TATUNG CHASSIS

In late 1981 Ray Wilkinson provided a detailed account of the Decca 120/130 series chassis and the reasons for adopting the circuitry it used. Time and the technology don't stand still and the current range of Decca-Tatung chassis differ in many respects while retaining the single, compact PCB approach. Ray Wilkinson brings us up to date on the 140, 145, 150, 160 and 165 series chassis.

### ● SERVICING THE MULLARD/PHILIPS TELETEXT DECODER

Mike Phelan starts a new series, this time on teletext equipped sets. The series will describe the operation of teletext decoders and explain how to go about fault finding. Mike comments that the diagnosis of faults is very easy since the decoder, being a digital device, tends to produce a screen display showing the precise nature of whatever ails it. The teletext version of the Philips G11 chassis is taken as the basic example – many of these sets are now available from disposal warehouses at reasonable prices.

### ● THE N. AMERICAN TV SCENE

Keith Cummins spent several weeks recently in Canada and the USA. We asked him to take a look at the TV scene over there: his report brings out the many differences in the approach to providing TV services in N. America compared to the arrangements we're used to in the UK.

### ● MORE ON THE HYBRIDS

S. Simon with further guidance on quick checks for defective hybrid receivers. This time notes on the Pye 697 and Thorn 1500 chassis.

### ● COMMISSIONING SMATV SYSTEMS

As a follow up to his recent article on TVRO installations Geoff Lewis reports on small master aerial systems.

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modification was to add 100k $\Omega$  resistors in series with the A, B, and C inputs to the MC14493 LED display decoder chip, i.e. between pins 8, 9 and 10 of IC3 and connections D3/4/5.

All this suggests that the SL471 consumes more current than the SL470. In the Ferguson TX9 and TX10 chassis the use of different receiver chips enables the SL470 to be replaced with the SL471 without modification.

Our main reason for writing is to help people who've

built the project and find that they have to replace the SL470 with an SL471 due to failure of the device.

*K. Stanley and R. Wateridge,  
Stanley Television, Portsmouth.*

**Editorial comment:** Our thanks for this helpful suggestion. We would not recommend constructors to build this project today since difficulties are likely to be experienced in obtaining line output stage components.

## In the Workhouse

**Les Lawry-Johns**

Yes we're back in the workhouse again – after a very lean period that extended from before spring until well into the autumn, a period when we fretted and wondered whether the trade would ever come back. The theories we pondered were many and varied, e.g. more reliable sets, too many spare sets and so on. Whatever the real reason, the wheel seems to have turned and the sets are now coming in thick and fast. Mainly G11s and T20s, with the odd ITT and GEC set for good measure. I'm glad of this since I don't like those odd sets with strange sounding names that were born half a world away, and I don't take in videos or computers either. They're too complicated for me. Fault tracing with a logic probe? Ugh! "How does he live?" I can hear you say. I suppose the answer is that we don't have a staff to pay, we don't want expensive holidays and we're always here when wanted. In the workhouse so to speak.

### Tony's Ordeal

It seems that not only us men read this magazine. Apparently lots of women do as well. I know Keith Cummins' wife does, but then she was a local lass before she met him – him and that Casablanca image he projects. It would appear that Tony's wife also reads this Macho Magazine and when she read that bit in the November issue about Tony wearing black tights etc. she wasn't very pleased. What can I say? It was all by way of a joke dear, honest. The fact that Tony has been threatening to throw bricks through our windows late at night has nothing to do with this apology, nothing at all. It wasn't Tony who wore the tights. It was Jim (now I'm for it).

### The Pye 725

Do you remember me telling you about the struggle I had with a friend's Dynatron fitted with the Pye 731 series chassis? If you recall, the trouble was to do with changing the BU208 line output transistor. Following the nightmare of removing the vertical panel I found that the screws holding the BU208 refused to budge. Son-in-law Duggie came upon the scene and offered to help using his car repair kit. The BU208 then came out all right but the panel was well nigh destroyed and took hours to repair. When I say how much I welcome a well known name on a set that comes in for repair I do have to admit to being dubious when one of these Pyes comes along.

One that I'd sold several years ago came in the other day. The centre 800mA h.t. fuse had failed but a meter check didn't record a short. Now this usually means that

the 0.1 $\mu$ F (1.25kV) first anode supply reservoir capacitor inside the top of the line output stage screening has shorted, but it hadn't. So a new fuse was fitted. It blew and another check was made. This time there was a short-circuit, and it just had to be the BU208. I tried to slacken the screws without removing the panel but had to accept defeat. So the nightmare started. It eventually came out and the BU208 was replaced. Now it's one thing to remove these panels, another to put them back complete with all the plugs etc. I know there's an easy way. It just doesn't seem to work for me and reading instructions is an art I've never mastered. I always forget what I've read as soon as I've read it you see. No, the 725/731 series isn't one of my favourites – not when there are line output stage troubles.

### Droopy Draws

I suppose the G11 is one of my pets. These sets don't seem to give much trouble when they come in – and they do come in, thick and fast. EW troubles are normally due to dry-joints or the fact that the BY223 has caused the BD238 to fail. One that was a little different came in recently. No dry-joints could be found so we swung the line scan panel round and there it was: old droopy draws. The EW loading coil hung down in shame. It was like looking at myself. We always keep a few of these in stock, so in no time the new and more substantial coil was fitted and the raster sides were nice and straight again. It did look sad though, drooping down like that.

### Such a Nice Girl

A car stopped outside and I could see that the driver was a young and very pretty girl with long blonde hair. So I resolved that I would do my best for her. She got out and I could see that there were two young kids and a baby in the car. Someone else had been doing his best already. She yanked a 22in. T20 out of the back of the car and casually brought it into the shop. Strong too I thought. She put it on the bench and without further ado told me about it.

"Fucking thing's gone again" she declared.

I didn't know what to say, me with my delicate upbringing.

"Where's it gone?" I gasped.

"It ain't gone nowhere you nit" she snapped. "I mean it's gone wrong again and I'm bleedin' fed up with it."

"When did I last do it?" I asked.

"Ain't bin here before. Those Snappy Service idiots had it – three times."

So I ventured a look and found that the BU208 was short-circuit. "Call back in half an hour and I'll tell you more about it" I whispered.

"Hope it's going to be done properly."

"So do I."

And away she went, roaring off down the road and

leaving me to fit a new transistor and test the set.

It had a funny way of coming on, remaining faint with curled edges for quite some time. This suggested to me that the power supply module was at fault, with probably one of the small 47 $\mu$ F capacitors suspect. So I fitted a replacement power panel and everything came on nicely and behaved itself.

She came to collect it. "Do you think the bloody thing will be all right now?"

"I hope so, but I've only fitted a power board and line output transistor so I can't speak for the rest of it. It's yours dear, not mine."

She said something nasty, paid up and went.

She was back next day and the air was blue. I yelled for help and Zeb came bounding in. He took one look and bounded out again. Some guard dog. H.B. popped her head around the corner and popped it back again. I was alone and felt lonely. I got the set in – she didn't carry it this time – and found that the 1.6A fuse on the power panel had blown. Fortunately I'd fitted a pair of 47 $\mu$ F capacitors (7C4/5) on the original board and this was now in full working order. It was replaced in a flash.

"Just a little thing. I'm sorry you've been bothered" I apologised.

"I suppose you want another small fortune?"

"Oh no madam, it's on the house. Our pleasure, so pleased to see you . . ."

"Bollocks" she snapped as she departed, I hope never to return.

### **The Network Colour Portable**

After all those G11s and T20s and the experience just recounted an old friend popped in with a set I'd not seen before. It was a Network NW1414 14in. colour portable. I took the rear shell off, peeped inside and was depressed to see a chassis that lowered just like a NordMende, with a thyristor line output stage etc. Dead was the complaint and I just happened to spot a wirewound resistor sprung open at the top centre. R607, 1.2k $\Omega$ , 5.5W. The set started up when I touched the resistor together so I soldered it back. The set then worked perfectly and I left it on for some time, noticing that the resistor remained quite cold. I concluded therefore that it was a start-up resistor that had been suddenly asked to do a bit more than usual and wondered why. Having run it for some time I returned it to its owner.

He brought it back next day and I said I'd keep it for a week just to make sure. Once more the resistor was open and the set functioned perfectly when the contact was restored. It then continued to function every day for a week and has now gone back. I wonder what it was – and hope I don't have to find out.

(Editor's note: The set is one of the Grundig Networks, GCS100 chassis. See page 608 of the September 1984 issue for information on R607 going open-circuit.)

### **Zeb**

I mentioned Zeb's cowardice when confronted with the young lady of the blue language. He's not really like that. It's just that he doesn't like high pitched noises – and she was certainly high pitched. Fireworks have the same effect. Otherwise he seems to know no fear. He's a very good guard dog and kicks up merry hell when anyone comes near the door and we're not around. That means a lot to us. Just thought I'd put the record straight. Now, about that cat . . .

# next month in

# TELEVISION

## ● VCR DEVELOPMENTS

Major developments in VCR technology, including long-play operation and hi-fi sound recorded using helical tracks, have been introduced on up-market machines released during the last year. Steve Beeching explains the techniques used, with specific reference to the JVC HRD725, a full-specification machine with all the "trick" features and a vision noise reduction system.

## ● AMSTRAD CPC464 SERVICING NOTES

Practical fault-finding guidance on the Amstrad CPC464 microcomputer and its associated monitors, based on eighteen months' experience of the machine.

## ● DECCA-TATUNG 160 SERIES

Ray Wilkinson brings us right up to date with the current 160/165 series chassis. The 160 is noteworthy for the design simplification achieved. Interesting points of detail include the absence of a luminance delay line and line drive that keeps the line output transistor out of saturation.

## ● QUICK CHECKS – PHILIPS CTVs

S. Simon continues his series with quick check procedures for the G8, G9 and KT3 chassis, covering the common fault conditions (very few with the reliable KT3).

## ● TEST REPORT: THE PORTASOL IRON

What's this – a gas-operated soldering iron! While not suited to general bench use there are many applications where it's a boon. Eugene Trundle found the performance very good, with an adjustable capability of 10-60W.

## ● VIDEO SCRAMBLING TECHNIQUES

Video signal scrambling has come into wider use with the increase in the number of cable and satellite TV services in Europe. Andy Emmerson reviews the basic techniques employed.

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# And There's Another Funny Thing

Les Lawry-Johns

What strange things some sets can do. When Miss Converge brought in her Pye T194 portable (Philips TX chassis) I thought it would be another quick job. So she stood there while I fumbled about. She said it was the on/off switch and I wanted to show her that it wasn't. The supply was reaching the series regulator transistor but its output was only about 2V. So I checked the control circuit and everything seemed to be o.k. I took the tube base off to check for shorts or heavy loading but found nothing.

"Try the switch again" said Miss Converge.

"It won't make any difference" I growled.

Just to show her I switched the set on again and the sound burst out loud and clear. The only thing that was different was the disconnected tube base. I put this back on and the heater glowed merrily, followed by a raster. She smirked.

"It's not the switch" I insisted.

"All right then, try it again."

So I switched off, waited a while and switched on again. Nothing happened. I removed the tube base and the sound burst out. Put the tube base back on again and a picture appeared.

"If you fit a switch it'll be all right."

"Yes dear, if I fit a switch to turn the tube's heater off until the set has started up it'll be all right."

"Well do that then."

I was in no mood to argue, so I fitted a single-pole switch on the back cover and wired it in series with the tube's heater. I realised I was doing something wrong, but if that's the way she wanted it at least this would save me having to think. We could now switch the set on with the rear switch off, then close the rear switch and the tube would light up and everything was fine. I made sure she understood the procedure – keep the rear switch in the off position until the sound comes through.

After she'd departed, feeling satisfied that she'd been right all along, I was left to wonder what part of the control circuit had been at fault. I'd checked everything (I thought). Have you had a funny feeling like that? You probably found out what it was, like I should have done.

## To Sweat or Not to Sweat

It's not often that a G11 makes me sweat, but one did the other day. The chap said he didn't want to spend more than twenty quid on it and I told him I didn't think that would be necessary.

I checked the h.t. line for a start. There was a short that disappeared when I removed the BU208A's plug, from the top. So I removed the line output transistor subpanel, fitted a new one and also a 1A fuse in the h.t. fuseholder (the one in there was 2.5A). Both the 3.15A mains fuses were intact.

With the new panel fitted I switched on. There was a flash from the 3.15A mains fuses and I found that two of the bridge rectifier diodes were dead short. I wondered

about this but fitted two BY127s and new fuses and tried again. There was a brief rush of sound and a spark from the tube base, then nothing. The glow switch on the power panel glowed and some smoke came from a resistor. The 1A fuse had failed and the new BU208A was short-circuit. Oh yes, I'd also taken out the green 470 $\mu$ F h.t. reservoir electrolytic and fitted a nice blue one.

The price was beginning to escalate so I thought I'd better check the tube. It was cracked. I took my blue 470 $\mu$ F electrolytic out and wrapped the whole thing up.

"Sorry sir, it'll be a lot more than twenty quid I fear."

## Sam Boy

Sam is a local character who is slipped the odd pound by everyone who receives his "Morning Guv" greeting. This enables him to live comfortably without the need to work – except to clean the occasional car or something. He reminds me of a song we used to sing during the last war.

"Sam boy was a lazy goon  
who never would work in the afternoon,  
too tired was he, too tired was he.  
Into the woods he used to go  
just to get his head down low  
under a tree.  
When along came a bee  
making this noise  
bzz, bzz, bzz, bzz.  
Go away you bumble bee  
I ain't no rose, no silly little flower,  
get off my (censored) nose, away from here.  
If you want a bit of . . .  
you can . . .  
but you'll get no . . . here.

A silly song maybe, but an evocative one. It brings back memories of the pubs in Gib (Main Street) and Alex (Beer Street) . . .

*Prodnose:* I don't see the point of all this and suspect you're merely trying to be vulgar. Your editor has been consulted and you are asked to stick to TV matters.

*Myself:* I'm sorry. I'll try to do just that.

## Nobody Told Me

So where do all the turkey eggs go? The question occurs to me at this time of year and no one's ever been able to shed any light on the matter. Until the other day – in the pub this Sunday lunchtime.

"I asked him why you can't buy turkey eggs. The farmer said they only lay fertile ones which are hatched. The rest of the time they just gobble."

Well I never. Not like chickens after all. I also heard it said that farmers don't know how long pigs would live if they were allowed to. Then they turned to me and asked how long a TV set lives? I had to say that after ten years it's anybody's guess.

# You won't believe me

**Les Lawry-Johns**

Last month I commented on the fact that TV sets can do some strange things. Here's another case, this time involving a Thorn TX9 chassis.

## **The TX9**

A chap brought the set in and put it on the bench. I was busily engaged on a portable but he asked me to do a quick job, at the same time looking anxiously at the clock. So I put the portable to one side and whipped the back off the TX9. The 1.6A mains fuse had shattered and a light shone on the board revealed that the bridge rectifier diodes were in a sorry condition. I removed them and the red cover and wired the replacement diodes underneath for a quick test. After fitting a new fuse I switched the set on. The e.h.t. rustled up, a picture appeared and a look of profound relief showed on the chap's face. The picture then suddenly disappeared and a bright blank screen took its place. Very bright, as you get on certain GEC sets (PIL/20AX chassis) when the 82k $\Omega$  resistor in the RGB output stage clamp circuit goes open-circuit. Before I could take any action the 1.6A fuse failed again, with a pop. This time a check on the bridge rectifier diodes revealed that they were innocent, and no shorts could be recorded. I fitted another fuse and tried again. The picture came on and seemed fine. Suddenly the blank screen appeared and while I was making some quick checks in the RGB output stages the fuse once more failed. Since the screen appeared blank white I reasoned that something was affecting all three RGB output stages, but why this should have blown the fuse puzzled me.

The chap became very agitated and said that if it was going to take any longer he'd rather return the set "to her". I didn't argue as I could see that he was upset, so I removed the bridge diodes to allow the red cover to be refitted and he took the set away.

Upon reflection, the strange thing was that the full h.t. was present at the collectors of the RGB output transistors, which are d.c. coupled to the tube's cathodes. I'd have thought that some 190V here would have blanked the tube instead of being accompanied by a bright, blank raster. The only conclusion I can come to is that C209 (0.1 $\mu$ F), which decouples the bias applied to the tube's grids, must have been going short-circuit intermittently. It's taken to the 190V line instead of to chassis to provide hum cancellation. But why should this have blown the fuse? I wish he hadn't been in such a hurry.

## **The Philips G6**

You may recall the Philips G6 I mentioned a couple of months back – the one I sold many years ago when I could have sold my first G8. Well Mr. Furnace has since died but the set still carries on under the guidance of Mrs. Furnace. She phoned recently to say that the colour was now very slow to appear, so I went along to investigate. I was amazed at the clarity of the picture, though there was no colour. So I changed the EF183 and EF184 valves in turn. This made no difference, and the voltages all seemed about right. I then tried a cautious turn on the

core of the reference oscillator's coil. "Colour" cried Mrs. Furnace. "Bingo" I replied.

So there it still is, working and giving a perfect picture – with a tripler in place of the previous e.h.t. overwinding etc. Supplied in 1970. How about that?!

## **Infra Red**

Ray brought in this Fidelity handset and was moaning because it wouldn't work. I had a radio set on the bench at the time so I switched it to long wave, tuned it to 200 metres and directed the handset at it. Nothing. I replaced the battery (Alkaline MN1604) and again pointed it at the radio. There was a series of clicks as the buttons were pressed.

"Well I'm blown" said Ray. "Is that all it was? It's three years since I bought that set from you and I never thought about it having a battery in it". I nipped upstairs and tried it on our CTV14S and it worked perfectly, as the radio set had said it would.

## **Thanks Denis**

I'd like to thank those of you who offered me help with the Network colour portable whose start-up resistor would intermittently spring open. Special thanks are due to Network's service manager Denis Mott. I took down all you said Denis – about directing heat at the suspect components – and will follow this advice when the set comes back, as you all say it will.

## **Bounce, bounce, bounce**

I was quite annoyed with a well known store that expressed doubt about taking my cheque (business account). Having identified myself, they accepted the cheque and overcharged me sixty three pounds. I got that put right and went away mumbling about their strange way of doing business.

Later that same day a nice man came into the shop and said he wanted a portable set for his daughter. He selected a nice black and white Pye and said he'd collect it later but would pay for it now. He presented me with a cheque for sixty nine pounds, on his business account, and wrote his address on the back. H.B. gift wrapped it and it looked splendid there waiting to be collected. He came back next day and expressed delight with H.B.'s efforts. He left in high spirits and we were pleased.

Next week we were not so pleased. The cheque had been returned as his account had been cancelled. I wrote a note to him at the address he'd given. This came back from the Post Office marked "gone away". Oh well, a small price for experience – it could have been a lot more.

## **Problems with Scotch**

As I write this the festive season (Christmas through to the New Year) is at its peak. Here's a little story about a friend who's also a reader. He was at this party and had had a few beers. The host brought him a scotch (neat) which he was not used to drinking. So he topped up his

glass from a nearby water jug. "Um, not bad" he thought. There was a repeat performance and after that he began to feel funny but quite happy. Before he passed out like a light he was vaguely aware of a young lady emptying her glass into the water. "Wassat?" he enquired. "Vodka" she replied, "I've been doing it all evening - can't stand the stuff but you can't very well say so".

Next day he was decidedly out of salts. Daft you may say, but it can happen - especially if you're basically a beer man.

While on the subject of Scotch, an apology. Some time ago I did a job which was a bit of a swine for Mr. Webb. He gave me a china bottle in the shape of a ship's bell. Now I drink a lot of that brand of whisky and I said the contents were nice but not that brand. A few days ago I was presented with an ordinary shaped bottle of the same brand, with a black label marked twelve years old. It was identical to the scotch in the china bottle. Sorry Mr. Webb, I'm so used to the cheaper stuff. I feel ashamed of myself . . .

## Developments in VCRs

### Part 2

The first long-play VHS machines were introduced in 1983. For long-play operation the tape is run at half speed (11.7mm/sec). This has several implications. First the track width is reduced by half, from 49 to 25 microns: as this reduces the signal-to-noise figure new noise reduction techniques have been adopted. Secondly for stable playback in the long-play search modes special "jump" circuits have been designed. Further luminance signal correction is used to reduce h.f. noise.

### LP Track Characteristics

The characteristics of the LP track are determined by the slower tape speed and the extra set of LP video heads fitted to the dead drum. In some early models the LP heads were mounted at an angle of 70° with respect to the standard-play heads, though in later models the two sets of heads are mounted on single assemblies as described in Part 1 last month.

With standard-play VHS operation the tracks are laid down side-by-side with a 1.5 TV line offset between the start of each track to ensure that lines with the same colour phase lie next to each other on adjacent tracks and that the line sync pulses on adjacent tracks line up. It's not possible to achieve this symmetry in the LP mode, due to the effects of tape speed and track angle. Fig. 1 shows the difference between the SP and LP tracks: you can see that with the LP tracks shown at (b) the 0.75 line offset (half the 1.5 line SP offset) results in the adjacent line patterns being displaced. The adjacent colour phasing is also displaced: whereas lines 2 and 316 in the SP mode carry the same PAL phasing the correlation between lines 2 and 316 is shifted by 0.75 of a line in the LP mode.

The standard colour crosstalk system used in VHS machines will cope with colour crosstalk in the LP mode but extra measures are required to eliminate the increased luminance crosstalk.

### Picture Search

The main problems occur during picture search however, when due to the increased linear tape speed a video head will cross over a number (usually around five) of its own video tracks as it traverses the width of the tape. In the SP mode the line sync pulses replayed by a video head as it crosses the tracks it recorded occur in regular order - with drum speed correction - at 64µsec intervals. Picture search at the same speed will with LP tracks produce line sync pulses that are by no means at 64µsec intervals: without correction the result will be considerable picture skew (sideways pulling).

**Steve Beeching, T. Eng.**

A section of recorded tape is shown in Fig. 2: the upper edge of the tape is to the right and the lower edge to the left (the slanting recorded tracks are shown horizontally to make things clearer). A ch. 1 head is shown scanning across the tracks in the forward picture search mode. The burst phase is 135° on lines shown as clear blocks and 225° on lines with diagonal-line shading. In this example the head crosses over four of its own recorded tracks.

The top line of the timing part of the diagram, line (1), shows the original signal - it's a reconstruction of the replayed lines and colour phases as the head crosses over its own ch. 1 recorded tracks, i.e. tracks 1, 2, 3 and 4. You

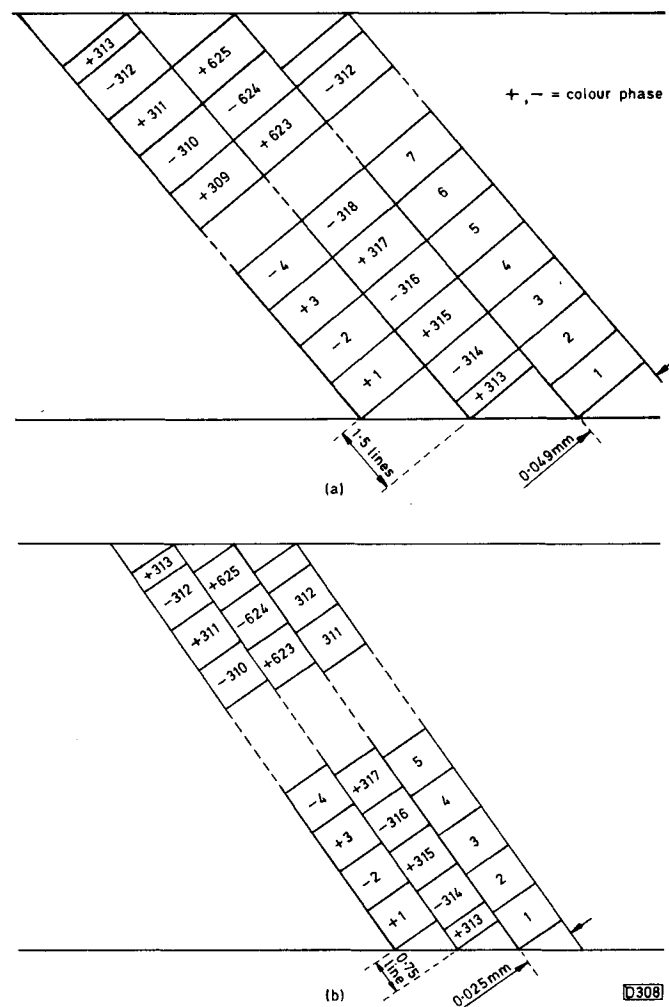


Fig. 1: SP (a) and LP (b) track characteristics.

# Horror Stories

**Les Lawry-Johns**

This lady brought in a Fidelity CTV14S colour portable. "It's hissing" she said, "it doesn't belong to me – it's my neighbour's."

I removed the rear cover and plugged the set in. The line output transformer started to hiss and sparks came from it. "Leave it with me" I said, "I'll dry it out and see whether that stops the problem. Call back later this afternoon."

## **The Arc Over**

So I dried it out with a hairdryer and sprayed it with Plastic Seal. Switching on, I was quite pleased to hear that there was no hissing. I plugged in an aerial and a good picture appeared. A nasty arc over then suddenly occurred around the line output transformer and the field collapsed to a line across the screen. I assumed that the spark had damaged the field output chip and was surprised to find that this was a TDA3561 – it was the later version of the CTV14S. I looked through my chips and couldn't find one. No one I phoned seemed to have one either. So I phoned SEME and got one the next day. I fitted it in the portable and was most annoyed with myself when it didn't clear the problem. Oh yes, in the meantime I'd fitted a new line output transformer which I had in stock. I now had a hissless set but there was still no field scan.

I must confess that I didn't have the complete circuit for this fairly recent set, so I was in some doubt. I phoned Fidelity and received some good advice. "If the voltage at the scan coil plug is less than 13V, change the TDA2578A sync/timebase oscillator chip." Again I couldn't find one and again no one locally seemed to have such a thing. Feeling a bit sheepish I phoned SEME again and they didn't shout at me. I got the chip the next day and fitted it. Glory be, a nice blank raster.

I plugged in the aerial and the sound was loud and clear but the blank raster remained blank, with the brightness and contrast controls having no effect. In fact the only way to control the raster was by means of the first anode preset, which is part of the line output transformer. I started to panic. The brightness and contrast controls worked on the TDA3562A decoder i.c., which has twenty eight pins, so I checked everything else.

All this would have been avoided if I'd replaced the line output transformer in the first place instead of trying to rescue the old one. Mrs. Clearwater wasn't going to be too pleased with her bill. When the set had come in it had showed a good picture and I had told the lady who'd brought it in that I'd phone the set's owner when I'd got it sorted out. I'd better get permission to proceed. So I did this first. Now to proceed . . .

The signals went into the TDA3562A but didn't come out. The voltages were present but the output voltages were high. So I looked for a replacement chip which I knew I didn't have. Now don't get me wrong. We keep lots of chips in stock – all those I think we'll need. I just didn't think we would need these so soon and we wouldn't have done if I'd only fitted a replacement transformer in

the first place instead of drying the old one.

I felt terrible when I phoned SEME again, but luckily this time a different girl took the order. All those girls must be nice – efficient too. In no time she told me that the chip was in stock, then proceeded to tell me where I lived. Something to do with the computer, Stan said. And I've always hated those things. Live and learn.

Anyway the next day the chip arrived and was fitted after a bit of a struggle. At last I was able to phone Mrs. Clearwater to tell her that the set was ready. "Funny" she said, "all it did here was to hiss, and you've had all that trouble". This may seem a trifle to you but it was a nightmare to me, feeling guilty all the time because I'd taken the wrong action in the first place. I'll know next time.

## **It Ticks**

Eddie brought in his Thorn 9800. "There's not much wrong Les, it just ticks." I scowled at him. "When these sets tick you're in trouble, and so's the bloke who has to sort it out."

"Never mind Les, just have a look."

So when I had a chance I looked. It just stood there ticking. I brought my 25V power supply into action and fed 25V to the mauve lead on plug 4 on the decoder panel – these sets tick when the internal 25V supply is missing. Sound burst out but there was no sign of life in the line timebase – no e.h.t. I checked the line output transistor (VT851) and it said it was all right. I removed the screws and turned the line output panel up. The base-emitter readings didn't seem right, so I removed the plug from the right side panel and checked again. R858 (8·2Ω), which is in series with VT851's base, was open-circuit. I didn't have an 8·2Ω resistor so I put in two 4·7Ω resistors (KT3 type) in series. The set then worked beautifully, displaying a nice picture, but channel six was on instead of channel one. I touched selector one: the set hesitated then reverted to six. I touched all the other selectors and it still came back to six. I cleaned the front and this made no difference. So I removed the internal screws that hold the selector unit and pulled this out, away from the plug pins. I sprayed the front panel inside and the result, when the unit was refitted, was that position three was displayed and couldn't be shifted. I put the set to one side as I was fast losing patience.

I polished off a G11 and a Pye 725, then returned to the 9800. I pulled out the selector panel, leaving the front unit still secured to the front moulding by three screws. With these off it could be removed from the front and stripped down. The plastic strip needed a thorough clean and after doing this I refitted the unit to the cabinet, pushed the selector unit back on and put the screws back. It now came on with channel one displayed (fancy that): 3, 4 etc. could be selected but not channel 2.

My spirits were beginning to get low after all this. I replaced neon two and that didn't make any difference, so I checked the voltages and found that two differed quite a bit. My eyes strayed downwards and immediately caught sight of a red lead snapped off the panel that held the ML237 chip: the two ends were visible and were quickly soldered together. Channel two could now be selected and the job was done – except for an odd dry-jointy noise on the sound. Disconnecting the audio plug from the top of the signals panel stopped the noise so I concluded that the output stage, which is on the power supply panel, was in order. I spent some time replacing suspect items, includ-

ing the MC1358PQ intercarrier sound chip and associated components. The noise had then gone, but came back after a while. I eventually had to admit that the trouble could be in the audio output stage so I replaced the output transistor, using an MJE340 turned round: the trouble stopped and the sound remained clear.

What an ordeal! I know it doesn't sound much, but it

damages my confidence – which has always been sadly lacking – and I feel a bit let down when I'm tackling jobs that won't go right. When the thing is eventually done I feel a lot better, but I still have this feeling that it shouldn't have taken so long.

Eddie got a ticking off when he came to collect his 9800.

## Vintage TV: US Sets of the 50s

Chas E. Miller

Since American design tends to reflect the "big is beautiful" school of thought (cars, buildings, etc.) one might think that their TV sets have all been on large and opulent lines. In fact the range of sets on offer around 1950 extended from some genuine monsters to sets that were much smaller than anything to be found in the UK at that time. But whatever the picture and cabinet size, there were certain design features common to all US sets – dictated by the different conditions in the States.

From the start American TV had been organised on commercial rather than public service lines. This meant that in large centres of population viewers could receive programmes from several different stations while in more remote, rural areas viewers required very sensitive receivers if they were to get acceptable pictures (the situation mirrored that of the early thirties, when powerful, selective radio sets were developed to provide reception of the proliferating number of radio stations on air).

Thus from the start all US sets had to be capable of receiving twelve channels (2 - 13, ch. A1 never being used for scheduled TV transmissions). This made the use of superhet tuning essential (in the UK the BBC's monopoly in the early days made it possible for many setmakers to opt for t.r.f. designs). To provide sufficient gain and selectivity, the tuner units and i.f. strips employed large numbers of valves compared to the designs with which UK servicemen were familiar.

The sets had to work from mains voltages between 110V and 120V – no problem with an a.c. supply since a mains transformer could be used, but liable to cause problems if the designer opted for the a.c./d.c. type of power supply. Those unfortunates who had d.c. supplies were likely to remain only would-be viewers since most sets eschewing a mains transformer tended to use a voltage-doubling circuit that would not, of course, work on anything other than an a.c. supply.

### Pilot Table TV

We'll take a look at a couple of sets that illustrate opposite extremes of US TV receiver design of the period. First a small-screen set. The Pilot Model TV37 was a small table model fitted with a tiny three-inch c.r.t. with electrostatic deflection. It used a total of twenty valves, many of them double-triodes, and was suitable for use with 105-125V, 60Hz supplies.

The tuner unit employed three 12AT7 double triodes. Three triodes were used for low-band (55-25-87MHz) operation and the other three for high-band (175-25-215-75MHz) operation. Tuning across the bands was continuous, by means of ganged capacitors, the front band selection and tuning knobs being concentric. Each r.f. amplifier triode was used in the earthed-grid mode, with the input to its cathode via broadband transformer cou-

pling. Similarly the other two double-triodes were split between the two bands, as local oscillators and mixers. This arrangement enabled a commendably simple band switching system to be used: only the aerial input circuit and the h.t. supplies to the two local oscillators were switched.

The tuner was followed by a four-valve i.f. amplifier using 6AU6 r.f. pentodes. These were similar to but not as sensitive as the EF91 found in many contemporary UK sets. The vision detector used the only solid-state device in the set, a 1N34 diode. The following video amplifier stage employed a 6BA6 pentode, a valve more commonly employed as an i.f. amplifier in radio sets – it had a vari-mu characteristic. Its output was a.c. coupled to the tube's cathode, with the brightness control setting the d.c. level here. Intercarrier sound was a feature of many US sets from the start. In this one the intercarrier sound signal was tapped from the video amplifier's anode and fed to a single 6AU6 i.f. pentode. This was followed by a 6AL5 in a ratio detector circuit and a 35B5 as the output beam tetrode. Negative feedback was provided by returning the output valve's cathode to chassis via the secondary winding on the output transformer. The video output valve also provided the input signal for the sync separator pentode, a 6AU6 which was operated under unusual conditions – upside down in effect!

The technique used in this set to get round the low mains voltage was to obtain both negative and positive h.t. rails from the mains supply. The sync separator valve was operated from the negative rail: its anode load resistor and screen grid were taken to chassis while its cathode bias network was connected to the negative h.t. line.

The two timebases were basically similar, each using two 12SN7GT double triodes. Both oscillators consisted of cathode-coupled multivibrators, but while the field oscillator was operated from the positive h.t. rail, with the cathodes returned to chassis, the line oscillator was operated in the upside down mode, like the sync separator, its anode load resistors being returned to chassis. The two output 12SN7GTs were used as push-pull amplifiers to drive the deflection plates, and to get an adequate voltage swing both stages were connected between the negative (–120V) and positive (112V) lines. Even this wasn't quite enough for the field output stage, where the anode load resistor of one of the triodes was connected to a potential divider network across the e.h.t. supply. Fig. 1 shows the line output stage – the likes of which we've not seen before in this long-running series! A d.c. supply was connected across the deflection plates to provide centring (the same technique was used with the field deflection plates).

The negative supply was useful for several other reasons. It provided the supply for the contrast control,



within a single DBS channel designed for a 625-line signal. DATV is basically a bandwidth compression technique: the role of the digital component of the transmitted signal is to provide the receiver with control information to enable it to reconstruct the picture without significant degradation compared to the original. One example of the use of the DATV digital component is to carry information about which parts of the picture are moving and which parts are stationary – several bandwidth reduction techniques rely upon this information being made available to the receiver. Another example is to carry data to help reconstruct a sequentially scanned picture which, to save transmission bandwidth, has been converted from

sequential to interlaced scanning.

Early results of experiments at the BBC's Kingswood Warren Research Department indicate that the DATV technique can provide HDTV quality even where the signal bandwidth has been reduced by a factor between two and four. DATV can also be used to improve the performance of 625-line systems with associated digital capacity such as the MAC/packet family of transmission standards. The BBC's deputy director of engineering Charles Sandbank sees DATV as "a powerful technique to squeeze HDTV signals through the bottleneck of transmission channels using the sort of technology that will be in our homes in the 1990s".

# Hush My Mouth

**Les Lawry-Johns**

If you remember, a couple of months ago I bragged about Mrs. Furnace's set: a Philips G6 which I'd sold to them some sixteen years ago. I mentioned how good the picture was. Well, she phoned the other day to say that the picture had gone into lines. So I packed my bag with care, taking with me in particular a PCF802 and a PFL200, the latter in case it was rolling too. In these sets you see the luminance output valve is a PFL200, the second pentode section being the sync separator.

We arrived at the house and switched the set on. When it had warmed up, the picture was in lines and I could see that it was also rolling over. So I decided to fit the new PFL200. As I did so I noticed that a small nearby resistor looked the worse for wear. It was one of the sync separator's anode load resistors, R2121 (68k $\Omega$  – it's a single-standard G6). Just to be sure I measured it and found that in fact it wasn't too far out. To be safe I replaced it, then tried the set again. This time the picture looked fine: I left Mrs. Furnace with her praise ringing in my ears. "Don't retire yet Les."

## Next Day

Next day she was on the phone again. "The picture's all white with no picture but the sound sounds fine." I didn't doubt what had happened. The glass of the PFL200 had cracked when I'd put it in. It's happened before to ham-fisted idiots like me. So off I went again, this time with three PFL200s just in case.

The valve hadn't cracked, but I noticed a resistor laying in the bottom of the rear edge. It was the luminance output pentode's screen grid feed resistor R2111. My lightning sharp (what?) mind immediately pointed out that an open-circuit screen grid feed resistor would have caused the valve's anode voltage to rise, not fall, thus blacking out the screen. But I checked the resistor's value, which was correct at 2.7k $\Omega$ . So I refitted it and to be on the safe side checked the resistance to chassis (in case the decoupling capacitor was short-circuit, which it wasn't) and fitted another PFL200. The picture was now as poor as it could be. There was plenty of colour but no luminance. I decided to try the previous PFL200. There was a puff of smoke from R2111 and it fell off its tags again, this time damaged beyond salvation. I kicked myself hard, then fitted a new PFL200 and a new resistor.

We were now back to the lack of luminance.

I looked askance at the BC148 black-level clamp transistor in the luminance PFL200's control grid circuit: if the previous valve had gone short-circuit between its screen and control grids the transistor would have been dealt a mortal blow. I looked twice at the chassis and decided to remove the panel (three screws at the top). This done it was a simple matter to replace the BC148 – except that I didn't have one with me. I did however find a BC147, and decided to fit that. It worked fine and once more we had a lovely picture. I tottered out into the snow and managed to find my way to the nearest off-licence – I never drink at work but make up for it in the evening.

Mrs. Furnace phoned later that night, after I'd downed a few whiskeys, to say that her picture was rolling. "If you look at the back of the set you'll see that a knob sticks out at the lower rear centre. Turn it slightly, looking at the picture through a mirror: get the picture to roll down, then turn the control so that the picture rolls up and clicks into lock. O.K.?" I presume that when I refitted the rear cover the last time I'd moved the control slightly without realising it. She hasn't phoned back, so it's either all right or she's called in a more able engineer who's not thinking about retiring.

## A Handy Tip

Here's a handy tip that's been passed on to me. Apparently lots of 20in. Philips sets fitted with the KT3 chassis are suffering from loss of blue and green to leave a predominantly red picture. The cause is loss of emission in the blue and green guns – the heaters are slightly underrun and the cathodes become contaminated. The tip is to short out the heater chokes on the tube base. Put a link across one of the two chokes and note the difference after a day or two. If there's no improvement, put a link across the other choke as well and leave the set working in this way for a day or so. When full emission has been restored, remove the links to leave the set in the original condition (chokes in circuit). I haven't tried this yet myself but we've a couple of KT3s that could do with it.

## Reggie's Mum

Reg Butcher is in fact our butcher. He's an important person since he supplies Zeb with his weekly bones as well as our meat. When H.B. called into his shop last Friday Reg told her that his mother was in dire straights with her TV set. Would Uncle Les put in an urgent call?

So Les paid her a visit. She opened the door and I said "I've called about the TV". She told me my visit wasn't necessary as it had been fixed. I was a bit taken aback

because I knew they wouldn't call in anyone else and Reg always paid the bill. I told her that Reg had asked me to call.

"My Reg? Oh, you must mean the TV. I thought you were the telephone man. Come in." I went in and switched on the Thorn 8800. There was no green. She was talking away ten to the dozen about her ailments and the weather and what not whilst I tried to listen and answer, at the same time checking the voltages around the three top transistors. The voltage at the collector of the green output transistor was a lot higher than the voltages at the collectors of the other two output transistors. "What's wrong? Something gone has it? I suppose you'll have to order it and I'll have to wait as usual." I didn't answer as I was searching in my bag for a BF337. I found one, fitted it and the picture was then green. So I set the controls and wrapped the job up. "Oh you've done it then. I suppose they give you all those things in case you need them."

"No dear I have to buy them in case you need them."

"What happens if no one needs them?"

"I just have to keep them till they are needed."

"Oh, well. Never mind. Give my love to my Reg."

So off I went to present him with my bill.

"Thanks Uncle Les."

### **A Smashing Time**

Later that day I called to a customer who said the set was too big to bring in. It turned out to be a Ferguson set fitted with the TX10 chassis – a 26in. model that lived quietly in a corner of the room, under a shelf on which were displayed many china articles which I presumed to be Ming or something.

I pulled the set out and removed the rear cover. The fuse under the right side red cover had failed so I looked suspiciously at the focus control. "There was a spark and then the set went off altogether." That confirmed my suspicion. I replaced the fuse and rummaged in my bag for a focus unit (the long type with improved insulation). I found one and took it out of the box. "Oh" said the lady of the house, "look at the pretty elephants on that box." So I had to tell them what Stan had told me months ago, about Small Elephants and Mammoth Elephants. I could see they didn't believe me and I don't blame them.

As I was fitting the unit my shoulder caught against the shelf. There was a resounding crash as the china descended into the fireplace. I managed to catch one lovely plate in its plastic holder and handed it over to the lady. As I did so the plate toppled out and joined the others in pieces in the fireplace. "Oh, I'm so sorry" I mumbled, expecting to be attacked at any moment. "Don't worry" was the surprising reply, "they were only raffle prizes." Well I never. Most other people would have done their nuts, raffle or not. I fixed the focus unit and refitted the red cover. When I switched on a good picture appeared. We watched it for a few minutes to make sure, then I took my leave.

### **Smoke and Moans**

A chap was waiting when I got back to the shop. He was tapping his foot and moaning his head off. "You repaired this set for me a few months ago, now it's smoking."

"It's not good for it you know."

"It's not good for me either" he groaned. "Paying out all this money. I paid you ten pounds for this set only six months ago."

"No you didn't. You paid me ten pounds for an e.h.t. unit to save replacing the line output transformer which would have cost a lot more." The set was a Ferguson Model 3840 (1690 chassis) which has an e.h.t. rectifier buried inside the transformer. We fix an external, shrouded diode in series with the e.h.t. lead and this restores normal working. It was the lead from the transformer to the diode that was smoking, running a bit too close to the heatsink. I unsoldered it and slipped a used solder mop cover over it. This held it away from the heatsink. Soldered it up again and the job was done, i.e. no more smoke.

"There you are sir. You can stop moaning now. Good afternoon. May you have many more male children and don't let them smoke." As I rolled myself a cigarette.

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## **Second-hand VCRs**

**Derek Snelling**

In the November 1983 issue of *Television* I wrote an article on checking over second-hand VCRs. Since then some of the more modern machines have started to appear on the second-hand market. While everything said in the previous article still holds, certain extra points need to be borne in mind. So here's a short up-date on what to look for.

In the previous article the problem of pulsing with the Ferguson 3V22 was mentioned – the picture or colour moving from side to side when playing back a recording of a stationary picture. The most common cause of this at the moment is a worn pinch roller.

When checking in the picture search mode the presence of extra wide noise bars may be the first indication of head wear. The problem can also be caused by the fast forward/rewind idler slipping – this results in varying tension, particularly in reverse search. It applies of course only to machines fitted with this type of idler.

With the newer machines it's best to find out as much as possible about the model before you go to inspect it – in particular what it's supposed to be able to do and how many motors it has. For example, is the pause supposed to have a noise bar or not? Is the timer a one event or several type? Knowing the number of motors can have a bearing on such problems as poor rewind: if this is done by the same motor used for fast forward then a clean or a new idler is probably all that's required, but if each turntable is directly driven by its own motor the problem could well be due to a faulty motor.

Another point concerning motors. In some machines a noisy capstan motor is a precursor to wow on sound. If the machine you're checking seems noisy in the playback mode, press pause: if the noise goes away it's coming from the capstan motor; if it remains the lower cylinder could be worn.

Finally, most of the more recent machines have remote control. Don't forget to check its operation. Faulty wired remote control systems are usually easy to repair but beware of the type with multipin plugs. If the machine has an infra-red remote control system try to arm yourself with a set of batteries to counter any claim that "it's all right – just needs some new batteries".

Armed with the above notes and the previous article you should be able to avoid most of the pitfalls of buying a second-hand VCR.

# Other things and other places

**Les Lawry-Johns**

There's more to life than TV sets, though there are times when this is none too obvious. Anyway, I thought you wouldn't mind if for a change I told you about some other things and places.

## **The Coat**

One of these things is my overcoat. It was made to measure in 1938 by M. Burton and cost 37/6d. For those of you who want that in present day money it comes to one pound thirty seven and a half pence (I think). That coat is as good as new and still fits. It's double breasted and waisted. I've worn it twice during the last thirty years, which all goes to show how many funerals I've attended. Not quite true that, because an overcoat isn't needed in summer. Jealousy will get you nowhere. Oh yes, black melton.

## **The Journey**

Next places. A couple of weeks ago the phone rang during the evening. HB answered it. She sounded a bit excited and I heard her say "We'll come up and get it". Since her daughter Colleen was with us at the time she didn't say anything more about the conversation. After Colleen had left I was told all about it. Colleen had always wanted a small Dachsund and we'd sent out signals a month or two back in the hope of getting one for her birthday. One of the signals had now been answered: there were three puppies ready to leave their mother and we could have our pick. All we had to do was to hang up the Closed sign and pop up to Dersingham. Lovely, but where's that?

I consulted my AA New Book of the Road. It's just up from Kings Lynn, near the Wash. My eye wandered down the A10 to Ely, thence to Cambridge and Theydon Bois to pick up the M25 to Dartford Tunnel. Not far. Any idiot could do it with a full tank of petrol.

On the following Tuesday the tank was full, the oil was checked and we were ready to go. Colleen arrived at nine thirty and we were off. First to the Dartford Tunnel which is practically on our doorstep. I missed it. We circled round and after a slight detour through Bexley we got there. Never mind, we were on our way in my safe and strong hands. Straight up the M25 towards Theydon Bois, steer to the right and up the M11 and on our way to Cambridge. On and on like the brave six hundred my Grandad used to sing about. Harlow came and went, then Bishop's Stortford. Flashing along the motorway while other cars flashed past as though we were standing still.

Undeterred we fought our way up past Cambridge and on to Ely, my eyes like diamonds behind my new specs (first time wearing them for two years), though I must admit they were getting tired. King's Lynn loomed up and we went round a roundabout and took the A149 past Castle Rising on the left and finally hit Dersingham. By now the Ouse was ousing all over the place and had been

for some time: waterways to the right of us, waterways to the left. On we went, past the fish and chip shop, slowly now, looking for the flags. At last we found them and turned into our destination. A man was waiting at the gate. He'd been waiting for a long time.

HB jumped out and greeted him profusely. I was amazed. Then Colleen did the same. I got out and we shook hands like gentlemen.

"This is my Uncle Roy" said HB.

"Well I'm buggered" said I.

"This is my husband."

"Well I'm buggered" said Roy.

HB hadn't even said we were going to relatives.

Into the house where Roy's wife greeted us warmly. Colleen looked at the large box on the floor from which some whimpering issued. "Goodness, aren't they beautiful!" she cried. One had a black patch on its back. She leaned over and picked him up, then realisation dawned. "He's yours" we told her.

We had lunch and gossiped. I finished off my whisky and started on some wine. They'd a lovely garden where the birds were well catered for. While we were admiring its features we saw a bag containing a marrow and some beans being passed over the wall on a rope. Roy took the bag in and came out with a bottle of home-made wine. It was tied to the rope and pulled over the wall. Nary a word was said.

"Does that happen often?" I queried.

"Several times a week – the wife makes good wine."

"So I'd noticed."

By now it was almost two and I was beginning to wonder how long it would take to get back. So with Dacksy in a box and plenty of food for him we took our leave and departed, heading for King's Lynn. Somehow I took the wrong road and we went through miles and miles of country. There wasn't much sun but what there was I kept to the right of me so I knew we were going south. Eventually we arrived at Ely. HB glanced at the petrol gauge. "We're half empty."

I'd also been looking at it. "We're half full" I said.

We were well on the way to Cambridge now, but instead of bypassing it I found myself in the town centre. So many bikes, I've never seen so many. We went round the market square just for fun and headed out of town, eventually finding the M11. Down we hurtled while cars flashed by in the outer lane. The petrol gauge by now read very low. It suddenly occurred to me that there are no filling stations on these motorways. I didn't want to go off and get lost again; I also knew that an empty reading meant that there were still two gallons on board. But at the speed we were going they wouldn't last very long. So I gritted what teeth I had and slowed down. We crept along the M25 and under the Dartford Tunnel. Then along the A3 till we were able to fill up just three miles from home. We were glad to be back. Dacksy had slept all the way and even Douggie (Colleen's husband) likes him.

So much for the trip and its confusions. I don't know how ET manages it: from one end of England to the other about twice a week. But I'm not that bad at navigation. JAR gets lost trying to find his way from one side of London to the other (almost) on a good day with the light behind him . . .

## **Oven Problem (Microwave)**

You remember HB's sister Dot – her with the brown eyes? Well Dot has a microwave oven with two bulbs in it.

# Return of the French Lady

Les Lawry-Johns

You may recall the French lady whose ex-husband taught Scottish rig workers how to swim (she said). She has another set now and it's giving trouble. A Pye 731 which also gave me trouble, mainly because I didn't want to carry it from her flat, round the square and out to the car.

## The Pye 731

First there was intermittent sound which I thought was due to a dry-joint. It turned out to be a poor plug/socket connection. After getting this right the sound still wasn't clear – it sounded as if the speaker was rubbing. So I said I'd be back with another speaker as soon as I could. Shortly after I was back with a nice new speaker with a free floating cone and proceeded to fit it. She was nattering away and I vaguely heard something about the picture going off. With the speaker fitted the sound was fine and the picture showed no sign of going off. I tapped around but it wouldn't do anything wrong. So I left it at that.

Next day she phoned again and read out a long list of the times when the picture had gone off, apparently for very short periods and with no regular pattern. So I sallied forth again and this time managed to make the picture go off by applying pressure to the TBA990 chip on the decoder panel. I immediately resoldered every joint in the vicinity. After this I couldn't make it go off so I departed, thinking that that was the last of the matter. It wasn't. I had to return several times subsequently, replacing in turn the line output transformer, the BU208 line output transistor, the tripler and for good measure the 0.1 $\mu$ F first anode supply reservoir capacitor C563 (1.25kV). It was a nightmare and every time the phone rings I dread hearing that voice "allo, allo, this is ze French woman talking". And talking, and talking.

## Mother-in-law's Set

A young fellow brought in this ITT hybrid colour set (CVC8 chassis) and said it belonged to his mother-in-law. I'd no idea whom he was talking about. The repair took some time as the boost capacitor had gone short-circuit (as usual) but had this time taken the PY500A boost diode and 56 $\Omega$  h.t. feed resistor with it. I did all that was necessary and wrote out the bill, charging fifteen pounds. A fortnight later all hell broke loose.

A voice which I vaguely recognised phoned to say that the TV set I'd "thoroughly overhauled" was giving trouble after being moved round the room. So I got the car out and nipped over to see what I could do. I was appalled when she opened the door. I knew her all right, and knew the language to expect. Talk about that young girl with the long blonde hair, she was a saint in comparison. Leaving aside the language, the woman was demanding to know why a set that had been "overhauled" so recently should give trouble so soon. She waved the bill in my face.

"Look at this, fifteen \*\*\*\* quid. You should be ashamed of yourself."

"If I'd known it was your set I wouldn't have touched it in the first place" I bawled back.

Anyway, she insisted that I saw the set working. The

picture was wavy and the colour was in bars. I thought that moving the set had disturbed a poor earth connection. It transpired however that the AD161 l.t. regulator transistor (left side) was leaky. I had one with me and it was in before you could say knife. The picture was now perfect.

"I wonder how long that will last. You people certainly know how to rob us poor \*\*\*\*s."

"Well this poor \*\*\*\* is going off now, having performed a miracle in front of your eyes. I don't intend to repeat the performance. Goodbye."

I got to the car while she stood at the garden gate waving the bill in the air and bawling about wanting her money back.

## Beardy's Brother

I thought I'd seen the last of beardy and hope I have. His brother came in however, struggling with a 26in. TX10. The back cover was held on by Sellotape and I felt sorry for myself.

"This television you see, there's very little wrong with it. Just a little something that stops it working properly. I'll leave it with you and call back later when you've fixed it for me."

I switched it on and the tube's heaters glowed. Oh well, that's a start. He'd left the remote control unit and although I pressed the brightness button no raster appeared. The first anode voltage was low at about 200V. I smelt a rat – someone had been messing about. I turned up the first anode control until the voltage measured 400V. The raster was now present but with an aerial plugged in there was no picture. I checked the tuning but nothing could be resolved. The tuner was suspect but a new one had recently been fitted. So I turned my attention to the i.f. module. Fitting a replacement made no difference. Back with the original and out with the tuner, using a yard of desoldering braid because whoever had fitted it had been over generous with the solder. I fitted a new 1043 and got a picture that was very grainy. A.G.C. I thought, so I adjusted the small preset on the i.f. panel and it made no difference at all.

I thought the new tuner might be faulty and like a fool fitted another. Again no difference. The aerial socket may be? I connected a new one to the tuner, just hung it on so to speak. The picture was best with only the inner connected, the braiding left off. This confused me so I fitted another aerial socket which did the same thing. I left it for a moment to serve a customer who wanted to know why he was getting severe interference in the shape of another picture floating around on top of the one he wanted.

"Continental interference" we advised him. "Leave it alone and it'll go away."

When I got back to the TX10 I'd forgotten what conclusion I'd reached, and came to the conclusion I'd not reached one. I then injected signals into the i.f. module and found that the output was weak. So I refitted the new one. This restored normal reception and I wrote out a bill for a very reasonable (I thought) £20. I was prepared for a performance and I got one.

"Both these things faulty? One I can understand but not two. Are you sure?"

"Yes I am sure and it took me long enough to work it out. In any case I've only charged you for one."

"Twenty pounds is a lot of money. Can you make it fifteen?"

"I'll make it nothing" I snapped, tearing off the Sellotape that held the rear cover. "I'll put back your tuner and your i.f. unit and you can take it elsewhere."

"Oh no, no. I was only joking. Here's your twenty pounds. I never argue about money."

I refitted the Sellotape and off went beardy's brother, nattering away in a language I didn't understand.

### **Fidelity Portables**

The 14in. Fidelity portables (ZX2000 chassis) are now using up line output transformers at a rate of knots. If you handle them you must keep a couple of transformers in stock, complete with the small subpanel that enables the newer type to be fitted to the older type of panel. A leaflet explains the steps to be taken – remove the focus unit and first anode control etc.

One came in the other day with the complaint that though it chattered away in various tongues it didn't show a picture. I didn't at first associate this with the line output transformer as the fuse usually fails when the transformer is defective. In this case it hadn't because the 10 $\Omega$ , 2W h.t. smoothing resistor, in the feed to the line output stage, had gone instead. This left the chopper working and the supply to the TDA3190 sound i.c. intact.

### **Mrs Steadfast's New Set**

Mrs Steadfast has bought a new Fidelity from us. She complained because it didn't have a carrying handle and I complained because of the tuning arrangement. It has three buttons at the rear: up the scale, down the scale and store. It would have been easier if these had been at the front or on the side. It's easy once you've had a bit of practice however. Her old set, a 26in. Swedish monster, had to be carried out through the door, along a corridor and into the back room. I did it alone, though there was a male who didn't lend a hand present. I'll remember that Harold: the set was very heavy, and me in my condition. But I didn't complain. I never do.

### **Whatever Next?**

I had a shock the other morning. I got up fairly early to let the dog out and was pottering around in the kitchen when I heard a knock on the shop door. There was a large van outside, with Sheepless Nights on the side. The man at the door asked whether it would be all right to bring the bed in.

"I haven't ordered a bed" I said.

"I did" came Honey Bunch's voice from the toilet.

So in came this great big bed, which she assembled later in the day, and out went my nice comfortable favourite.

As we sat there that evening H.B. asked why I was knocking back the whisky (Cutty Sark this time).

"So I can face getting into that high, firm monster in there" I growled.

"We'd had that old one for twenty years. It had a dip in your side and was all misshapen."

So we went to bed and had a good night's sleep, much to my surprise. New bed – what next?

# next month in

# TELEVISION

## ● INSTALLING TVRO TERMINALS

Part 1 of a new series by Harold Peters on the principles and practice of satellite TV reception. Next month's instalment deals with basic installation – dish mounts and siting and tuning in the receiver.

## ● THE ELECTRIC MOTOR

The large numbers of VCRs nowadays being handled by service departments have brought with them a need to know something about electric motors. Mike Phelan's new series explains their operation and, since they can be expensive items, provides hints on ways of repairing them. The many different types of electric motor will be described.

## ● TIMEBASE SYNCHRONISATION

J. LeJeune deals with sync circuits, from the simple one-transistor sync separator stage to the complex arrangements used in modern sync processing i.c.s. Flywheel line sync will be explained, also the generation and use of sandcastle pulses.

## ● RGB INTERFACING CIRCUIT

Brian Webb presents a simple circuit that can be used to interface a microcomputer with RGB plus sync outputs to an older set with a delta-gun tube. An inexpensive way of obtaining an RGB monitor.

## ● SCAN YOKES FOR COLOUR TUBES

In Part 3 of his series on colour tube technology Eugene Trundle takes a look at the scan yoke and the ways in which yoke design has evolved to meet the needs of modern self-converging and pinfree tube systems.

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# Thanks Denis

**Les Lawry-Johns**

Some months back (January) I mentioned a Network colour portable – Model NW1414, fitted with the Grundig GSC100 chassis. The original fault was that the fusible resistor R607 in the start-up circuit would go open-circuit for no apparent reason. Resoldering it restored normal operation, and despite my suspicions nothing showed up during a prolonged soak test. Network's service manager Denis Mott subsequently got in touch and provided some tips. He drew my attention to his article in the September 1984 issue of *Television* and said that the set would come back to me. Well it did, after some months though.

This time I followed Denis's suggestions and also checked a number of other things. No fault could be found. I eventually resoldered R607 and everything was lovely for a day and a half. Then it pinged again and we started replacing components en bloc. The result of this was that the set refused to come on at all when R607 was resoldered. My language was deplorable and Zeb went away and hung his head. Spock jumped up on to the highest shelf in the shop. Honey Bunch was out so she didn't have to hear it. Suddenly I stopped swearing. This is what we'd wanted in the first place, a fault that was there all the time. Unless I'd put it there when replacing various resistors and transistors. Supposing one had been defective? But I'd tested them all before fitting, as I always do. So I put this thought out of my mind and started a general check.

The line output thyristor, which had checked all right during previous tests, was now open-circuit between its gate and cathode. It should record about 30 $\Omega$  one way and about 200 $\Omega$  the other, with no reading between the anode and the other two electrodes when disconnected. Now it showed no reading at all. It was speedily replaced: the set worked for the rest of the day and the week that followed.

## **The Blind Comes Up**

A chap staggered in carrying a 26in. Ferguson set fitted with the TX10 chassis. He explained that after about an hour's use a blind came up from the bottom, leaving just a few inches of picture at the top with the rest of the screen blacked out. I'd never heard of this one before.

I let the set run for some time, not really expecting anything to happen as the shop is a lot cooler than the customer's home. Then I removed the back cover and brought the hairdryer into action. I directed hot air at the field output transistors and the surrounding components. When I lingered on the TDA1044 chip the bottom of the screen blacked out and the blind rose until only the top few inches of picture remained. I grabbed the freezer but with the heat off the blind came down again and a normal picture was displayed. Again I heated the chip and again the blind rose, only this time I was ready with the freezer and the blind came down as soon as the chip was cooled. I didn't have a TDA1044 in stock so I looked under it to see what the ventilation was like. As there wasn't any near the chip I drilled a hole to let in some air. I explained to the chap what I'd done and mentioned that the TDA1044

would be here when the blind came up again – if it does come up again.

## **The Bush BC6004**

Shortly after our second encounter with the Network set a Bush BC6004 colour portable came in. Another German chassis, this time manufactured by Saba. The customer's complaint was that it would be fine for an hour then shut off! It's the set with the small enclosed unit at the top right containing the line output transistor (BU208), line driver transformer etc. I changed the BU208 and the set worked fine for the best part of an hour. Then it shut down again.

I tapped the BU208 with the handle of a screwdriver, more out of frustration than anything else. The set then started up and shut down after an hour. This time I moved the line output stage housing cautiously and the set started up again. So I took the housing out of its socket, having removed the two screws, and carefully resoldered all the input joints – though none looked suspicious. I then touched up any other joints that looked the slightest bit shaky and refitted the unit. It played away for the rest of the day and as far as I know it's still playing away quite happily. I wish I was.

## **GEC C1404H Series**

These 14 and 16in. portables are made by ITT in W. Germany, using the CVC1110/CVC1112 series chassis. They suffer from a common fault: a bright white screen, suggesting that the tube's cathodes have lost their bias. The RGB output transistors with their 12k $\Omega$  collector load resistors are mounted on the tube base panel. No voltage will be found on these resistors. The source of the 150V supply is the line output transformer: the series-connected rectifier diodes D504 and D505 are on the right side of the main panel. There's a small surge-limiter resistor in the feed from the transformer, R514 (1.5 $\Omega$ ). It looks very small and is intended to be, acting as it does as a fuse. It doesn't burn out for nothing. The cause could be leakage in the diodes or in the associated 10 $\mu$ F reservoir capacitor C506 or the 1 $\mu$ F smoothing capacitor C1002 on the tube base panel. Occasionally one of the three RGB output transistors may be at fault, but this doesn't happen very often. Then of course it may be the tube...

## **This and That**

The editor must be taken to task for a couple of mistakes that got into my column in the June issue. First about my overcoat. I said it cost 37/6d made to measure, also that this works at one pound eighty seven and a half pence. In print it said one pound thirty seven and a half pence. I also said that we filled up with petrol on the A2 just a little way from home. This came out as the A3, which is a long way from home. Oh well, I suppose we can't all be perfect...

It amazes me what Honey Bunch gets given to her. Boxes of chocolates by the dozen (we don't eat chocolates but Zeb does, so does her aunt). Last Sunday lunchtime we were in Dave's for a drink and H.B. happened to mention that she hadn't had duck's eggs for years. Next day one was brought in. I haven't had (given to me) a bottle of whisky since Christmas, and I'm not likely to till next Christmas. It won't be long now however. This year has simply rocketed by.



# June's Daughter

**Les Lawry-Johns**

You may recall me telling you a while back about a frustrating call on June, when her dog Piddler pinned me to the floor and was about to tear my throat out just before he recognised me. Well, her daughter got a relative to bring her set down to me and carry it in for her. It was a large 26in. ITT set fitted with the CVC5 chassis. Yes, an oldie – but in good condition. The report was that the picture went off but the sound stayed on.

I switched it on and when it had warmed up my neon glowed when brought near the PL509 line output valve. So the line output stage was active, but there was no sign of a raster – or sound for that matter. I tested this and that and when I checked the voltages in the sound i.f. stages dance music blared out.

"There you are" said June's daughter.

"That's radio music" I growled.

The same music came through when I was checking the final vision i.f. transistor and this suggested to me that the fault was in this stage. Now most of you know how difficult a fault in this section can be. I switched off and cold checked the BF123 transistor (T17). I couldn't get any readings from base to emitter or base to collector but I wasn't sure where I was in the confined space. So I reasoned (?) with myself. If the BF123 was open-circuit, I could hold a BF197 across its contacts as a check. Switch on again and allow the set to warm up. Sort out a BF197 and hold it in position, base to base etc. True TV sound burst out and a picture appeared on the screen.

"There it is" screamed June's daughter.

This scared me (women's voices do) and I withdrew the BF197. The sound and vision continued and I gave a sickly smile.

"Aren't you clever?" said June's daughter.

"Aren't I?" I agreed, wondering what the hell had happened. Tap the vision i.f. stage and move it about a bit. The vision and sound continued whatever I did. Pull the aerial out and switch off.

"We'll put the back on and pretend it's finished. Then we'll switch it on again to surprise it. That's what we'll do." And that's what we did. The picture was now grainy and horrible though the sound was o.k.

"Bloody tuner's up the creek" I bawled. "It wasn't a minute ago." So off came the back cover and I moved the tuner about a bit. A lovely picture came on then went all grainy again.

I removed the covers and laid the tuner on its side. Resoldering the r.f. amplifier transistor's base and emitter connections did the trick. After that it wouldn't go grainy again. We put the rear cover back and tried again. It was still all right. So they took it away, after I had warned them that the sound and vision could fail again at any time as I didn't trust it. The set hasn't been back so I suppose it's still all right. But what brought the BF123 to life – if indeed it was faulty? Perhaps it's me that's faulty? I can imagine E.T. chuckling away down there in Sussex. "Yes, it's you who's faulty Les!" Well I know I'm silly but the inspector of taxes had my books last year and couldn't fault them: there's not many can say that! And I did check the soldered edge connectors, so there.

You'd think the way I natter on that I don't have any real troubles. No so. Take the Thorn 9000 that came in the other day for example. I put a new tripler in it last week and this week it came back with the report that it was "no go – probably the switch". It wasn't the switch of course and there was plenty of h.t. at the collector of the R2540 Syclops transistor. I moved over to the line driver transistor and found that there was only 12V or so at its collector instead of around 150V. The same voltage readings were obtained at its base and emitter. Like a fool I dallied around the subpanel for a while, finding wrong voltages all over the place, also aware that I'd had this trouble before and had solved the matter in minutes. At last I listened to the voice in my head. It kept saying "thick film unit".

I got one off the shelf and fitted it, telling myself that it wasn't going to help matters. When I switched on again the e.h.t. rustled up. I knew it was going to be the thick film unit all along of course. It's just that I like to give myself a bit of exercise every now and again.

## **The Family Dawe**

I've mentioned the brothers Jack and Owen Dawe before. I've just discovered that there's another. Ray. I couldn't believe it. All I can say is that their parents must certainly have had a sense of humour.

Ray said he had a set that didn't like odd numbers. We asked him what it was. It turned out to be a Ferguson set fitted with the TX10 chassis, and it wouldn't select channel one – or three or five etc. "You've a duff chip" I told him, hoping I was right.

He brought the set in and sure enough a new SAA5012 remote control receiver/decoder chip restored normal channel selection. Peace was thus restored in Ray's household. He'd altered the selectors so that 2 gave BBC-1, 4 gave BBC-2, 6 gave ITV etc. but his wife had said that interfering with the set would bring bad luck. She was right.

After we'd replaced the chip and reselected the programmes the set worked for one day then gave up. He brought it back and we investigated. I lowered the rear, i.f. panel and the set behaved itself, showing a nice picture and producing nice sound. I raised the panel and it lapsed into sullen silence. Feeling a bit annoyed I lowered the panel again and everything was all right. Inspection showed that the cable loom was subject to pressure from the i.f. panel when it was raised and that the insulation had punctured. Only a slight movement was required to put the cableform out of risk. I seem to remember having had this one before, but such is the state of my deplorable memory that I can't recall when it was. The set now functioned correctly however and Ray had to face his wife . . . "I told you so" she said.

## **This and That**

Stan from SEME had popped in to take an order. He also wanted to know if I'd seen Ray Ling the Chinese fence. Daft, isn't he? Shortly after he'd gone a nice couple popped in to say hallo. They were from Blackpool and being in the area had decided to run Les to ground – they're regular readers. Thanks for calling, Chris and Jill. Hope to see you again sometime. Also hope you weren't too disappointed. I did get that set done. Can't remember which one it was, but I was in a bit of a dither over it for a while.



# Dogs can Fly

**Les Lawry-Johns**

They say that pigs can't fly. Well dogs can, and Zeb did last Saturday night. We were in the lounge above the shop and I was nodding off as usual, having had one or two. Now over the shop front we've an awning to keep the sun off the windows in the summer. There was a sudden commotion outside and Honey Bunch raised a window to see what it was all about. Two chaps on the other side of the road were shouting and shaking their fists at the world. They saw H.B. and shook their fists at her. Zeb was watching and didn't approve of this. In a flash he leapt out of the window, on to the awning and in one more mighty leap he was across the road, confronting the lads with bared teeth. They didn't hang around after that and the next job was to get Zeb back. He came in and bounded upstairs with tail wagging to prove that his incredible flight hadn't hurt him. The two fellows weren't the only ones to get badly shaken. H.B. and I were as well at the thought of what could have happened.

## **First Ordeal**

The reason I'd been nodding off was partly because the whole day had been horrible. It started first thing in the morning when a Ferguson TX10 was brought in. I started on it right away, removing the rear cover and checking the supply to the right side fuse. Nothing. So I checked the plug fuse and the continuity to the on/off switch then to the right side fuse. Everything was in order. I then realised that I hadn't plugged in the bench supply.

When power was applied to the TX10 the sound came through loud and clear but the LED on the tube base panel didn't light up. There was e.h.t. so I concluded that the trouble was on the tube's base panel or the supplies to it. The voltages were present however and the tube's cathodes were high. The LED had failed. I looked for one but couldn't find any. My ordering had gone wrong. Stan from SEME was at fault for not reminding me. I won't forget to have a go at him. But what to do? We want a voltage drop of about 3V. I stuck in a 75Ω resistor and got this, but there was still no raster. I checked the transistors on the panel and came to the conclusion that one of the BF460s was leaky. Once again I couldn't find one, so in desperation I fitted a BD410. This worked and I got a nice picture – for ten minutes. Off it went and I pondered. The BD didn't have the slope, so it had to be a BF like me. I fitted a BF338 with a heatsink. Good enough for the G8, good enough for the TX10. It worked all day and was collected at five o'clock.

## **The ITT CVC32**

The next horror was an ITT CVC32 with no field scan below the centre line and only about three inches of picture above it. I dived for the field output transistors and found one with funny readings. After changing it I expected to have a full field scan. It remained as before, with nothing below the centre line. I tried a new field timebase subpanel but this made no difference. I checked all the electrolytics associated with the output stage, then

carefully checked the subpanel above the scan coils. They were without fault. Further checks of just about everything relevant still produced no result. The scan coils were the only thing left. They measured all right but I still suspected them. The set is still here, standing around doing nothing because the customer won't accept the estimate for fitting a new set of scan coils. I'm waiting to find a yoke somewhere.

## **The GEC C2110**

My next failure concerned a C2110 series GEC set. The complaint was that the set would work perfectly for hours, then suddenly roll and following this produce a bright blank raster. It didn't do this for me. The picture rolled and pulled for a short period before going bright cyan, i.e. red remained normal but the tube's green and blue cathode voltages both fell. Investigation showed that the 12V line was missing as the spring-loaded resistor on the right-hand side had pinged open. As soon as this was soldered back the picture returned to normal for another few hours. I changed the field scan panel, also the audio panel in case it was loading the 12V supply. No luck. The screen became bright for a few seconds before the resistor pinged open again. I looked for a video panel but couldn't find one. In fact I'd had this set for some days as the owner was away. He came and collected it on the Saturday, showing no surprise that the cause of the fault hadn't been located. I suggested he took it to Geoff in Moon Lane. He did but wouldn't accept the estimate Geoff gave him. Where it went after that I don't know – unless he uses it for only a couple of hours at a time.

## **Pye Portable**

Our next case was a Pye colour portable fitted with the Philips CTX chassis. The mains fuse had shattered and there were open-circuit tracks to and from the bridge rectifier. This had gone short-circuit and the 4-7Ω surge limiter resistor had gone open-circuit. I fitted a KBL08 bridge, a new fuse and a 4-7Ω resistor and wired across the open-circuit tracks. The set then came on but was tripping. Investigation revealed a short-circuit diode in the line output stage. Question: why did the diode fail with the minor explosion the customer reported? Any ideas? I kept the set on test for a day or two as a precaution.

## **Barry's Sanyo**

Barry, a friend of mine in the CID, asked me to have a quick look at his 26in. Sanyo colour set. Now sets from the far east frighten me so I don't normally take them in and I don't keep spares for them. I said I'd have a look however and I did. Not so far eastern as it turned out, probably made in Sanyo's Spanish plant. The fuse was shattered and the BUY69 chopper transistor was short-circuit. The switch-off thyristor was open-circuit – it's the discrete component version of the Siemens self-oscillating chopper circuit. I put in a BU326 transistor and a BT116 thyristor. With a new fuse installed I confidently switched on. Nothing. The BU326 wasn't being switched on. Everything was in order in the start-up circuit so, not having experience of these sets, I carefully put the shorted BUY69 and the thyristor back, refitted the blown fuse and suggested to Barry that he took the set to a cleverer chap than I, such as Geoff up Moon Lane.

"Ha!" said Barry, "I'm going to tell that magazine you

write for you're not the clever fellow you tell them you are!"

"Don't worry – they know it already!"

### **The Last Ordeal**

I thought that the misery must be over. It wasn't. A couple I know quite well brought in a 20in. Fidelity set.

"It's gone dead. Someone's had a look at it but said they couldn't get the chip." Apparently it belonged to their son.

I whipped the back off and was confronted with an early ZX2000 chassis. Tapping the line output transformer I commented that "this is the weak link in these sets". I connected the meter to its feed resistor and got a short-circuit reading. "Instant diagnosis" I smirked.

I gave them an estimate and they popped off to consult their son, promising to phone within the hour. I thought I'd make sure and removed the transformer – no easy matter. It was shorted so I took a 3000 series transformer off the shelf and fitted the little base panel so that it would fit the 2000 chassis. I fitted it nicely and removed the focus

and first anode controls from the tube's base panel, wiring the leads from the transformer directly to the base panel as the controls are on the transformer (in case you didn't know).

I fitted the e.h.t. cap and switched on, expecting to hear the rustle of e.h.t. All I heard was the h.t. humming unhappily. I looked closely at the panel and found that the 10 $\Omega$  h.t. smoothing resistor had been removed. I'd made the test from the 4.7 $\Omega$  resistor between the 10 $\Omega$  one and the transformer. Clever me. So I fitted a 10 $\Omega$  resistor and switched on again. Hump, hump.

I then checked more carefully and found that the previous repairer, not suspecting the transformer, had had a good go at the h.t. supply and that the circuit now didn't agree with the circuit diagram at all. At this point I lost patience. I removed the new transformer, refitted the old one and the controls and wrapped it all up just as I'd found it. When they phoned I told them it had been messed about with and that I hadn't the patience to sort it out. Sorry readers, very sorry – but it was late and I wanted my bath and a drink. I had both and then had to put up with a flying dog. What a life.

## **Letters**

### **TVRO DISH INSTALLATION**

The advice on using the sun to find due south, given in Part 1 of your satellite TV installation feature, seems to me to require some qualification. It takes no account of the so-called "equation of time", which gives the difference between the time read by a sun dial and clock time. The order of the difference can be seen from the mean between the sunrise and sunset times published in many daily newspapers. With a maximum value of about 18 minutes in November, the changes are of the same magnitude as those shown in Table 2 for different locations in the British Isles.

*L.G. Whitehead, C.Eng.,  
Theydon Boise, Essex.*

**Harold Peters comments:** I have seen obscure references to this but decided to keep things simple. My readings certainly work out in practice here in East Anglia. Perhaps other readers would like to comment on this?

Mention should also be made of "sun outrages", which occur in late autumn and early spring when the sun follows the orbital plane, heating up a LNB with more s.h.f. than it can handle. The result is a noisy picture – also the possibility of a blown LNB. Even replacing a LNB can be a hazard at such times, due to the sun being focused on one via the dish.

### **RESISTOR PROBLEMS**

Gordon Haigh's article on resistor troubles prompts me to make the following comments on the subject.

The convergence potentiometers used in some sets (the GEC C2110 series for example) have a tendency to burn out, particularly when an attempt is made to adjust them. The two line tilt controls in the C2110, P501 and P502, are used as simple variable resistors. These two controls are very often set so that less than half the track is in circuit, the power dissipation being confined to that section of the track – hence the tendency to burn out. Reliability can be

improved either by using lower potentiometer values or by connecting a suitable value resistor in parallel with the original control. Where both ends of the track are in circuit, try a slightly lower value potentiometer with series resistors at either end to maintain the correct circuit resistance. These modifications will restrict the range of adjustment but the reliability will be improved.

A similar situation often occurs with the height control in a valve field timebase, particularly where the value of the control is 2M $\Omega$  or thereabouts. This can be replaced with one of a lower value – after checking the values of any series resistors and also the valve.

Finally a digression. My Feathertouch ITT CVC9 has recently been changing channels intermittently. I was just about to collect some tools when I noticed a fly walking about on the touch pads – perhaps it thought the red lights were strawberry jam or something! I've subsequently observed the same thing happen on a number of occasions. The only cure is to hang a small book over the front edge to cover the channel selector. This is worth bearing in mind if a customer complains of intermittent channel changing, particularly during the summer months.

*S. Pearson,  
Chipping Norton, Oxon.*

### **UNUSUAL HUM PROBLEM**

The problem with a Rank set fitted with the A823 chassis was a 50Hz hum bar. Closer inspection revealed that it was a slowly moving, sharply defined band of modulation on the field scan.

Theory number one was that the thyristor power supply was the cause. A new choke and electrolytics failed to fix it however. I admitted defeat and substituted an old faithful Thorn 3500 – only to get identical symptoms! We eventually discovered that the fault was present only when a newly acquired Philips G8 in a room twelve yards away was switched on.

Theory number two was interference via the mains supply, but examination of the mains filter capacitors and even trying a second G8 failed to cure the trouble.

Theory number three was that a magnetic field generated by the house mains wiring deflected the beam. This

# The Barefoot Contessa

Les Lawry-Johns

Not long since H.B. decided that our Alsatian Zeb was lonely. She enquired around and located a suitable friend for him in the Medway towns – a three-year-old German Shephard who had had puppies and had been seen to . . . One of her puppies lives a few doors from us and was on heat. It had been sitting on her owner's lap, which by a chain of events led to some problems. Her owner offered to accompany H.B. to pick up our new dog you see. As H.B. was driving, the new dog ("Duchess") sat on the lady's lap during the return journey. The arrival home was spectacular. As Duchess trotted in through the door Zeb caught what he thought was her smell and went mad. There was a monumental struggle, with TV sets toppling over everywhere and me losing my temper over this unseemly mess.

Zeb's sense of smell is more acute than I thought, but it didn't take long for him to realise that his attentions were unwanted. We very nearly have peace now but their boisterous playing seems to continue nearly all day long and completely upsets my dubious ability to think straight. Being of German descent I felt that the new arrival must be a Contessa rather than a Duchess – so Tessa she is. The few customers who came nowadays tend to get a shock when confronted by two such large hounds, but at least their sets are assured of protection.

## The Hitachi

A friend of mine lumbered in carrying what appeared to be a 22in. colour set. I saw the name Hitachi and started to make excuses.

"It's my mother-in-law's, Les. Just have a look and see if you can get rid of all that green."

I guessed that the tube was at fault but thought I'd make sure. He left it and in due course I took the back off, expecting to find an ordinary in-line gun tube that needed reactivating. The more I looked at it however the more confused I became. There was a single first anode supply, which is normal. It read correctly. I looked for the red cathode and found two pins marked RK on the left-hand side, two marked GK at the bottom and two marked BK on the right. The voltages on all these pins read the same, so the tube seemed to be at fault – there was brilliant green with very little red or blue.

Not realising what I was up against I looked for a common heater to connect the reactivator to. I checked the GK pins with the set switched off and got the reading I expected. I then looked for a grid pin and found two earthed. So I hooked up to this earth and to the pin marked RK and applied the heater voltage to the GK pins. There was a funny noise and the heater lit brightly. Heater, not heaters. I disconnected the reactivator and tried the set again. The picture came on immediately but was in magenta (red and blue) with no sign of green. Mind you, it looked a lot better than that green picture, but it dawned on me that I'd damaged the green emission. I studied the base more carefully and realised that each gun had its own heater supply, hence two pins marked RK etc. The cathodes are in fact the heaters and I remembered reading in the magazine some years ago about this unusual Hitachi tube. Why hadn't I remem-

bered earlier? It would have needed a new tube anyway . . .

## Another One

Shortly after this episode a nice couple came in and said they wanted help with their TV set which they couldn't bring in. I enquired about the make and the nature of the trouble. An Expert they said, the fault being that the top of the picture came down and went back up every few minutes shortly after switching on, the display eventually settling down. Memories of my friend's GEC-Hitachi set came back to me. Remember the elastic band that wasn't successful? I'd eventually had to take out the thick-film field output module and resolder all the contacts. In this way we gained the upper hand. I guessed that the Expert was actually an Hitachi and promised to nip over and solve the problem the following morning – only hoping that I was right.

I went, I was right, and I did it. What a clever boy! Incidentally these sets have the transit screws in the back cover in the same way as the TX9 etc. This makes removal of the cover a bit of a puzzle when you're used to dealing with sets that have been serviced before and don't have the screws fitted.

## Sad Tales

Another 26in. ITT colour set fitted with the CVC5 chassis caused me a nightmare the other day. The complaint was intermittent or no colour. I had to call at the house which was well out of town, so I resolved to do it there rather than bring it back to the shop. The colour came on at first. It then went into bars and faded out, leaving a pleasant monochrome picture. I tried another channel. The colour was again present but then vanished as before. Maybe the colour reference oscillator preset R311 was out of adjustment? I tried a new setting, but no luck. I tuned in the channel and the colour briefly appeared. In a nutshell I checked every likely item on the decoder panel. Nothing seemed to be at fault and all the voltages were as expected, changing only when the colour faded. I overrode the colour killer and faint bands remained despite adjustment of R311. I shunted the crystal and adjusted the relevant cores. Nothing doing.

Eventually I took it back to the shop, having struggled through the house and down the garden with this heavy set. Back at the shop I again tried to hold the colour and found that it faded before it reached the decoder. I checked the i.f. panel but this seemed to be in order and correctly aligned. Time was slipping by and so was my patience. I suspected the channel selector unit which can cause signal problems but decided to return the set to the owner with the recommendation that he took it to one of the brighter boys in the neighbourhood. I ran away feeling very ashamed of myself.

Back at the ranch H.B. told me that an acquaintance, an ex-TV engineer, had taken his own life. He'd lost his wife some months earlier and had been very depressed ever since. This completely deflated me and I've yet to recover. I know it happens, but even so . . .

(HA11703), part of which forms an a.g.c. stage. The input at pin 12 was correct but the output at pin 11 showed up all the distortions – the sync amplitude varied with picture content, in fact even the overall signal amplitude varied with picture content. So much for the a.g.c.!

From pin 11 the signal path splits. One path is the E-E one to IC3. The other returns to IC2 where after further processing, including a.g.c. circuit drive, the signal becomes the record f.m. for the video heads. This path incorporates a filter to remove the colour subcarrier

information. Just before it re-enters IC2 at pin 16 the luminance only signal is d.c. clamped by X5 (2SC2647C), which is driven by composite sync pulses from the sync separator in IC3. Because of the fault the waveforms were wrong all around this circuit, but the trusty meter showed that the d.c. conditions were correct everywhere except at X5 whose base, collector and emitter were all at the same voltage. An out-of-circuit check confirmed that this transistor was leaky – a BC184L in its place restored normal working.

R.R.

## Tiny Tim's Nightmare

Les Lawry-Johns

Tim felt very sad as he sat at his desk, swinging his little feet under his stool – as he had done some two years ago, hoping for a new pair of shoes. He had got some shoes then. Now it was a different matter. The half yearly clutter of bills demanded his attention: hundreds of pounds that would put him back in the red again, and he had only just got out from under the last lot, at a cost.

Why didn't these people realise who they were demanding money from? He fought his one man battle against inflation with extreme dedication. He didn't charge a lot for his services, much the same as he had done years ago. Then he had been rich and could dine out several times a week and drink the best wine. Now he couldn't afford to go out at all, not even once a week at Sunday lunchtime. He and Tinker Bell used to pop into the pub for an hour or two on Sunday and spend his whole week's wages. Now his wages buy a couple of bottles that have to last the whole week while he and Tinker Bell watch TV – and occasionally a film on the video to ensure that when they pass it or them on to Tim's brother he won't get a heart attack. Tim's brother has a very bad heart, much worse than Tim's, and the sight of all those young girls panting away might upset him. Tim didn't think they panted because of the fellow who was standing nearby. More at the thought of the money they'd be paid to pant. And why do they keep kissing their fingers? They must love themselves a lot more than they love the fellow who just stands around. I wonder what he gets paid for? Tim wondered whether anyone would pay him to stand around while...

### The Collection

Just then a lorry pulled up outside. It had a load of junk in the back and Tim guessed who it was. Tim the Tinker had come to collect his small portable. He came in and Tim handed it to him.

"What was wrong with it then?"

"I've written it all down on the bill sir."

"I can't read."

Tim's mind (our Tim) raced. If he couldn't read, the bill could be upped a bit. Instead of eight pounds fifty he could charge fifty quid.

"Ten pounds" he said.

"It says eight pounds fifty down here."

"Just testing your reading, just testing you see."

"I can read money, don't you worry about that" said Tim the Tinker.

So he paid his eight pounds fifty and walked out. Tim heard him say to the other chap in the lorry "tried to con

me, the twisting old B...". Tim felt ashamed of himself. What a nasty fellow he was.

### Visit from Keith and Alex

Keith and Alex had come up from Portsmouth mainly to bring me a set of scan coils – you remember the CVC32 (October)? I was so grateful, though I didn't actually need them. I'd already got over the trouble by replacing the scan coupling electrolytic which I'd previously shunted as an inadequate test. As the faulty one was leaky it had to be taken out and a new one put in. Silly me.

Keith gazed around and Alex gazed around the other way.

"Just as we imagined it would be. Beyond belief."

"Sorry, very sorry" I apologised.

"No, we didn't mean it's old fashioned or anything like that. It's just that it all fits into place. The awning outside where Zeb jumped out and earned undying fame, and the inside with all the bits and pieces. It's nice really."

Keith was the one who wrote that first letter (June) about the lack of test cards.

"You'll have to get up earlier" I suggested.

Alex was admiring our till. "Right out of Coronation Street" he commented.

"It's easy to fiddle" I said, "and I like it."

A chap came in for a universal tripler and Keith showed me where to find it on the shelf. The chap wanted to know how to fit it in an ITT CVC32. I explained how to connect the leads, joining the diode and earth leads together and soldering them to one side of the focus control. The chap went out with the diagram I'd drawn for him and Keith commented that it wouldn't last long with the leads joined. I wondered why he said that. I always join them. Am I doing something wrong? When I say always, I mean in the ITT and similar sets.

Anyway they departed in high spirits and I wonder if I'll see them again. All the best. Keep the flag flying and all that sort of thing!

### The Siemens Set

A 26in. Siemens set came in the other day and I couldn't make head or tail of it. A new line output transistor was required and the chopper circuit had been tampered with. The line output transistor is a BU600S, which I didn't recognise at all. I tried a BU208A but this didn't work and the open-circuit tracks to the chopper unsettled me. I suggested to the chap that he took it up to Geoff. He did, and Geoff had to suffer too.

Next day Geoff phoned to tell me not to send any more lunatics up to him. He also told me that the correct replacement would have been a BU208D. I keep these in stock and kicked myself for not having tried one.

The joke is that another set of exactly the same type came in an hour later and I was able to oblige my friend

by fitting a BU208D in a couple of minutes, with complete success – the resultant picture was superb. Nice sets these, though the chopper circuit does frighten me a bit. I should read the magazine more thoroughly.

### **The Cummin of Keith**

As I was busily shovelling up what the dogs do in the garden (concrete) I heard Tessa barking her loud, deep bark in the shop. Zeb doesn't seem to bark so much now that the bossy female has taken control. I went in with the shovel of you know what and found a man standing in the shop.

"Won't be a second" I said, "I'll just bung this lot down the toilet then I'll be with you."

"Don't worry Les, you look as though you've a lot on your hands".

I knew that voice, and the Casablanca image. It was Keith Cummins himself.

After I'd disposed of the er stuff we had a chat about this and that and whilst he drank the coffee H.B. had made him (sugar, no milk) he told me about the job he was engaged on. Some sort of secret service matter, which is why he told me all about it. Thanks for calling Keith.

### **Whatever Happened to Tiny Tim?**

Sorry I've been rabbiting on about myself as usual. Actually Tim was put to the test this last Saturday afternoon. He was standing behind the counter talking to young Phil, who pops in on Saturdays to pick up a few tips and dodges. A smart young couple came in and asked Tim if he would mind looking at their set. Tim said he didn't mind looking, went outside to their car and did just that. It was a Grundig set of the 5010 variety. A big 26in. monster. Phil came out to help, and they all struggled in with it.

"There's sound but no picture, and some things have burnt up in the bottom."

Armed with this information, Tim removed the rear cover and swung down the chassis. He noted two burnt out resistors at the bottom right. They appeared to be connected to the tripler. Tim's ice cool brain began to function, under the gaze of the young lady whose amused smile showed that she didn't think Tim knew what he was doing. Tim held his neon near the line output transformer and it lit weakly. He switched off, removed the feed to the tripler, and switched on again. This time the neon lit brightly. Tim announced his opinion.

"The tripler has failed and has burnt out the resistors in the beam limiter circuit."

The circuit was folded up inside the set. Tim removed it and gave it to Phil to check on the resistors. He then went over to the shelf and selected a universal tripler.

"Do you want me to fit this and replace the resistors?" he asked.

The girl still smiled. "Do you think that will do it?"

"Yes dear, with a bit of luck, and provided the transformer hasn't been damaged" said Tim as he fought off the urge to smack her bottom.

"O.K. then" they agreed. Tim fitted the tripler carefully and wired it up. In the meantime Phil had found the resistors and Tim fitted these as well. He switched on and a lovely picture appeared on the screen. The girl's smile faded and Tim was glad.

"Pay up and take the thing away" he said crossly.

They did and Tim and Phil drank their coffee, relieved that the Grundig hadn't wanted more doing to it.

# next month in

# TELEVISION

## ● SERVICING THE SONY KV1800UB

Though this was one of the first Sony colour sets to be released in the UK large numbers were sold and many remain in use – still giving good results. Unusual features include a decoder that deals with the PAL signal though not in the conventional way. David Botto provides a detailed report on faults and servicing.

## ● TV BEHIND THE CURTAIN

This time Keith Cummins' wanderings have taken him behind the Iron Curtain. A report on the different TV conditions in the USSR, including strange aerials and hybrid colour sets with SECAM decoders.

## ● CRT HEATER VOLTAGE CHECKER

The practice of deriving the c.r.t.'s heater supply from the line output transformer makes it difficult to check the voltage. Yet there are few more important voltages in a TV set since the heater supply has a profound effect on tube life. J. LeJeune's novel checker is simple, easy to use and fairly immune to misuse. It employs a lamp, a preset resistor, a silicon solar cell and a 50µA meter. It will enable you to ensure that the c.r.t. heater conditions are correct – a check that's particularly useful after fitting a regunned tube.

## ● BRUSHLESS DC MOTORS

The direct-drive, brushless motor has become the most popular type for video use. In the concluding instalment of his series on electric motors Mike Phelan describes this type of motor, the basic drive circuitry and some common fault conditions.

## ● MORE ON ACTIVE DEFLECTORS

Roger Bunney provides practical guidance on the choice of aerials and amplifiers for use in active deflector systems.

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ADDRESS .....

# Tiny Tim's Testing Time

Les Lawry-Johns

Things had been slack for some months and Tim was beginning to get used to it, even to like it. Except for the bills that kept coming in.

Then, last Friday, the avalanche started. The first one came in at nine o'clock.

"I'm just off down town. Be back in half an hour. Don't want to spend more than ten quid. Ta Ta."

Before Tim could say "...off" the chap had gone, leaving neither his name nor any other information. So Tim wrote PIG on the sheet and started to lift the set on to the bench. Another car then pulled up outside and a bloke staggered in carrying a 26in. Bush set of the Z718 variety. He panted out his name and address and Tim felt sorry for him. "Call back at lunchtime" he said, after being told that the screen kept going blue before the tuner selectors failed. As the chap went out someone else came in. A music centre this time. None of the lights lit, one side was dead and the stylus was broken. Tim's eyes noted the Shure cartridge.

"Call back on Monday."

"But we want it for our party tonight."

"I'll try but can't promise."

Tim put the jobs in line and was about to start on the first when a woman came in with a white portable of the Thorn 1690 variety.

"I can't stop and talk about it. I want it for Sunday and the only time I can call to collect it is on Sunday morning at about ten o'clock. Do whatever needs doing. Bye for now."

She trotted off before Tim could say a word. His Sunday had gone for a Burton as usual. Oh well, mustn't moan.

Minutes later a large ITT FT110 was brought in. "Picture's very dull and it won't respond to the contrast."

Tim's mind said "beam limiter", but he didn't actually say anything. He didn't like the FT110, mainly because he'd not done a lot of them. And he couldn't remember how the beam limiter worked. But he knew the owner quite well. "Phone me tomorrow and I'll tell you all about it."

Left alone Tim started on Mr. Pig's set. It was a Pye CT200. He hardly had time to note the smashed tube base when another lady came in.

"Would you lift my record player out of the car for me?"

Tim went out to the blue Volvo estate and noted what appeared to be a radiogram standing in the back. It was one of the large, old HMV ones. A record player indeed, with a Garrard unit, twin speakers, etc.

Tim lifted it out while the woman chattered. "It was going all right except it wouldn't play the records right through, then it went dead. I said to my husband I don't want you mucking about with it, I'll take it to that little man down the road. They say he can do things all right and doesn't charge much. Not like some of these people do nowadays and you don't know what they get up to, do you? I think it's all wrong that people should take your things and interfere with them like they do, then charge you through the nose."

Tim put a tenner on the bill right away but he didn't say

much. "Pop in tomorrow" he suggested.

"Oh dear, I'll have to do without my Mozart tonight" she moaned. Tim took her name etc. and off she went, talking away to herself nine to the dozen.

## The Pye's Problems

Back to the Pye. After a bit of a struggle Tim repaired the tube base socket and refitted it. When the juice was applied the heaters lit. There was a blurred raster and Tim realised he'd left the focus lead off. With that refitted the raster could be resolved but there was no picture or sound however much he fiddled with the tuner selectors. So he went down to the rear left side where the tuner joins the i.f. gain and filter unit. He removed the latter and resoldered all the contacts, noting that the one from the tuner had a track crack. Ah ha! This done the sound boomed out and a grossly misconverged picture appeared. This was attended to and he was left with a nice teletext message wishing him a pleasant day. Hardly had he finished when the owner appeared.

"Ah Mr. Pig, your set's ready after all."

"Name's not Pig, it's Sty."

"Nearly right sir."

"Actually I was only joking about calling back for it in half an hour. I've been told it's beyond repair. Thought you might give me a chit to that effect."

Tim got a bit angry. He switched the set on and showed the Sty man.

"Good lord, as quick as that. You must be a genius."

"I am but I don't let it show" said Tim modestly. He wrote the bill out and handed it to the Styman.

"Heavens. That much for such a short time?"

"Cheap for a genius, sir."

So off he went and Tim was left wondering. The set had been knocked over or off, and seeing the broken tube base someone had assumed that the tube was cracked. Oh well.

## The Big Bush

Tim next turned to the big Bush. He soon found that it was a nightmare. First he took the tuner out and renewed the plastic nuts - one of the four had cracked open and was jamming the channels, as the blue ones do.

With the tuner refitted he could get a picture and was better able to see the effect of the blue flashing. He went over the blue drive from the TCA800 chip to the driver and output transistors and found that the voltages at all points varied with respect to the red and green channels. The most marked variation was at the collector of the blue output transistor.

Removing all three c.r.t. drives should have left a blank screen. It flashed blue. Tim's diagnosis was immediate and wrong. A heater-cathode short-circuit in the blue gun he thought. So he carefully removed the heaters' chassis connection and wired a resistor between the blue cathode and the heater. No change. It then dawned on him that the short-circuit was between the grid and cathode. His muddled mind recalled the adaptor he'd invented years ago to deal with a grid-cathode short in a tetrode tube by

shorting the grid to the cathode and transferring the drive to the first anode. "All right with a monochrome set but you can't do that with a colour tube with its three guns, you fool!" he scolded himself. The things that go through your head when you're faced with a problem. Tiny Tim's trouble is his tiny mind. Not like you lot out there.

But he had to make up his little mind. He'd render the blue gun inoperative. He disconnected the supply to the blue gun's first anode. This left a slight blue haze in the centre. It wouldn't worry anyone but of course the picture was only a pleasant red and green, with no blue apart from the faint glow. The owner didn't complain and said he's seen enough blue to last him a lifetime...

### Ribald Club Strikes Again

Next on to the bench was the FT110. Tim surveyed the displayed picture and again thought to himself "beam limiter" – and remembered that he'd been proposed as president of the Ribald Club (removal of beam limiters). He studied the tripler and its earth return circuit, then checked all the components here. Each one checked out perfectly so he moved over to the left-hand side and studied the transistors concerned with beam limiting – three of them, T212, T213 and T214. He checked these and the associated components – quite a few of them – and again each one checked out all right. He then removed the front panel to ensure that all the connections were good and that the controls were working. He refitted the panel and injected signals here and there from the final i.f. stage to the luminance delay line. The signals were lost somewhere between the distribution amplifier stage T211/T206 – the stage that provides separate feeds

to the a.g.c., luminance and chroma circuits – and the luminance delay line. The beam limiter transistors act on the distribution amplifier stage and Tim found that the voltages in the beam limiter circuit were wrong. He got more and more confused and after an hour or so he did something very naughty, he shorted out the first transistor in the beam limiter circuit, T213, by linking its collector and emitter. The picture was immediately restored to normal. He removed the short and made further investigations but still couldn't find anything wrong. He finally lost his temper, shorted T213 again and left it shorted. Ribald indeed.

### Tim's Audio Department

He now turned his attention to the record player and heaved this on to the bench. On moving the pickup arm over towards the centre he found that it stuck before it got there. This was an old one indeed (the fault, not the deck). He took the turntable off and freed the small swing arms on the toothed wheel, removed them and cleaned the centres with easing oil. They now swung happily and the turntable was reassembled. He turned the unit on its end and removed the bottom cover. A fuse had gone though it didn't look like it. First bit of luck today thought Tim. It now played records and changed properly, so it was returned to the corner.

The Fidelity music centre was the one with the Shure cartridge, a fact that worried Tim a bit. He had the stylus in stock but they're costly. In fact when he'd got the whole thing working and the lamps fitted etc. the stylus cost more than the rest of the repair (shouts of traitor!), but they wanted it for that night and they happily popped down to the bank to draw out the money (why they didn't want to write out a cheque Tim couldn't say, but they paid cash and departed happily).

### The Portables

Tim finally turned to the Thorn 1690 – and some other portables that had been brought in during the day. The 1690 gave him a stiff time. There were shorted turns in the line output transformer's e.h.t. overwinding. Tim selected an overwinding from the shelf – he'd sent for some a week before. He fitted the winding with care and confidently switched on. The result was a faint, small raster with poor sound. A check on the stabilised supply line showed that it was at 8V instead of the expected 11V. So Tim checked the regulator circuit thoroughly and noticed that it was running warm. He went through everything in this area and was getting more and more angry. At last he removed the new overwinding and prepared to give up the job. Then a thought struck him. He switched on again and the sound boomed out while the tube's heater glowed brighter. He couldn't believe it. Another overwinding was quickly fitted and a perfect picture appeared.

Tim said (shouted) some naughty words and the dogs hid away in shame. The cat licked her paws, having heard it all before. Tinker Bell appeared and announced that the vacuum cleaner had failed. Tim shouted at her as well but repaired it anyway. The Electrolux had shed a connection at the suppressor (remove four screws and take the top off to gain access). The connection was soldered back on and peace was restored. Tim then returned to the other portables and waded through half of them, the other half being deemed not worthwhile after an initial inspection.

The rest of the jobs had to wait another day. Tim hoped the whisky wouldn't be too cold.

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further.

After some years of service the carbon track of the special, chassis-mounted R/G scan-correction potentiometer R478 (5k $\Omega$ ) tends to flake off. As a result it goes open-circuit. This potentiometer is no longer available from ITT, but as a hole was provided on the chassis for the knob to go through it's usually possible to obtain a

similar or larger wattage replacement and fit it so as to give screwdriver adjustment.

Note that the usual static convergence magnets are supplemented by three potentiometers at the base of the convergence box, R682, R684 and R689. These should be set to the centre of their travel before adjusting the magnets.

## Bless 'em All

*Les Lawry-Johns*

Having seen the Singing Detective on TV I was reminded of that awful period last autumn when I was covered with psoriasis. It appeared just as my usual mild summer attack was waning. Perhaps the shock of my friend's suicide upset the whole system, for within a matter of days I was covered with it – except for my face which was relatively free. In this condition I went to see Laura Lovitt – the one who used to have the dicey Decca.

### *The Singing TV Engineer*

This time it was a TX9, suffering I hoped from nothing more than a failed fuse. I took the back off, pulled off the fuse cover and checked the fuse. It was open-circuit with no sign of blackening. So I slipped in a new 2.5A fuse and switched the set on. A nice picture appeared and Laura came over and placed her hand on my badly affected shoulder. I had to shake the hand away and Laura stared at me.

"Can't I touch you now?"

"Not at the moment dear. I'll show you why."

So saying I pulled back my sleeve to show her the mess. She backed away.

"It's VD you see."

"Ahh" she screamed. "Keep away from me you beast."

I laughed as I pulled down my sleeve. "Don't worry Laura. It's actually psoriasis and I can't give it away. It'll go when it's ready, which shouldn't be long now. A friend of mine hung himself and this came up all over me. Nice isn't it?"

I could see that Laura was glad to see me go. Fortunately it did clear up soon afterwards.

### *The Prinzvision*

Back at the ranch I found a Prinzvision TV171 17in. monochrome portable on the bench. The tag said intermittent field collapse. I didn't have a circuit and I couldn't see the field output transistors, only those around the height and hold controls – and they were small ones. When I switched the set on the raster was fully scanned. I directed the hairdryer around the height control area and the raster collapsed. I then sprayed the area with freezer, but the white line remained. I sprayed here and there until it looked like something from the depths of the Yukon (which I wrote about some time back but the editor cut out because he doesn't like Eskimo Nell, spoil-sport that he is...).

At last I got around to making a more intelligent examination and followed the scan coil leads down to chassis, then looked underneath to see where they went. They sloped off up to the left-hand side, to a raised heatsink panel where the two output transistors lived. I

never thought of looking up there. I sprayed them and the front one turned out to be the culprit. It was replaced in a flash, restoring peace on the home front.

### *The Pye 741*

The chap who brought in this Pye set (741 chassis) said "it comes up from the bottom and pokes a finger up at you". This I had to see. I connected the set, switched on and a perfect picture appeared.

"I'll leave it with you so you can look at it."

"Thanks very much, very nice of you" I said.

Well after about an hour the bottom of the picture came up about four inches (26in. tube) and a black finger poked up at the bottom right side of the reduced picture, just like the chap said it would. I was shocked. Fancy it doing that to someone who was going to try to make it better.

The set had vertical panels like the 725 series and I thought that the trouble would be on the upper right side field output panel. I tapped around this and even pulled the earthing tag off. This relieved the load on the supply, which is derived from the line output stage to the left of the tube. The voltage rose and the 30V stabilising zener diode decided to go short-circuit. This destroyed the 6.8 $\Omega$  filter resistor which didn't even spring open. I was a bit upset by this since these items are not in the most accessible of positions. Some time was spent on replacing them. When peace was restored and a raster at last appeared on the screen it was fully scanned.

I examined the field output panel with ice cool eyes (glasses off). There appeared to be many dry-joints which were attacked with my usual ruthlessness, iron and solder. Nothing escaped. After this the set remained stable for about four hours and I concluded that I'd won. The owner returned to pick up the set and paid – all in ten pence pieces. His son later told me that they were from his money box. The swine!

Later that night, as we were drinking our whisky coffee, we heard a bang on the shop door and the dogs went mad. I slipped down the stairs and found the same bloke standing there.

"It's gone again and I paid you."

"O.k. old chap, bring it back tomorrow and I'll give it a longer test. At the moment I'm entertaining the Queen and Prince Philip."

"Posh, aren't we?"

"Not really. They often pop in when passing."

So it came back next day and I spent some time trying to find out what had damaged the zener diode. The one I'd fitted was big enough for gawd's sake but it had gone short-circuit. I took it out and switched the set on. There was full scan and the chap who'd brought it back admired it, together with half his family – whom I wanted to get rid off as quickly as possible.

"That's it. You've done it."

I protested weakly that it could well happen again and that he wouldn't like it much if it did.

"It's not me mate, it's the wife. She screams the place

down when the finger comes up."

"Get rid of her, that's the best thing. Or tell her to repair it herself."

And off they went, doubtless to return another day.

### **A Call from Mrs Furnace**

Mrs. Furnace had phoned to say that her Philips G6 (the one I bragged about some time ago, having given sixteen years long and faithful service) had given up the ghost. I rushed up to her house to hear her sad story and took the back off the set while I listened. As I could find no juice at the on-off switch I lay on the floor and played

with the two-pin plug that went into a shaver socket that went into the mains switched socket. There was juice there all right. Mrs. Furnace accused me of looking in the wrong place.

"My light lights when I plug it in there, so it must be all right."

I undid the two-pin plug and found a lead out. This was refitted and we tried again. The set now came on and worked fine.

"Could I have done that myself?"

"Yes dear. You didn't need to spend that long and lonely evening on your own. But how were you to know that?"

## **TV Fault Finding**

*Reports from Philip Blundell, Eng. Tech., D. Burke, L. Dinsdale, Roger Burchett, Paul Hardy and Michael Dranfield*

### **Philips K35 Chassis**

This set was suffering from a very bad case of hooking on video playback. There have been quite a few modifications to the chassis to improve the performance with VCR operation but this set had the latest version (BY05) of the sync module and should have been all right. A stock BY02 module was tried and gave correct operation, so the two circuits were compared to see what the differences were. One was that C375 had been removed. Fitting this capacitor produced a stable picture. **P.B.**

### **Telefunken 415 Chassis**

Continental TV sets with multi-band tuners catch me out every time! This example had very bad patterning on ITV only and I'd changed the tuner and half the components in the i.f. strip before I thought to check the band switching voltages. Yes, the set was trying to receive Bands I, III and u.h.f. all at the same time due to a leaky band switching transistor. **P.B.**

### **ITT Digi-3 Chassis**

Intermittent operation of the remote control system was the problem with this set. Substitution proved that the fault was on the control panel, but a change of all the socketed chips had no effect. The supplies were o.k. and the remote control signals were reaching pin 12 of the microcomputer chip which was intermittently ignoring them. Applying freezer around the clock oscillator seemed to instigate the fault so T1410 (BC238) was replaced. This restored normal operation. **P.B.**

### **Philips G11 Chassis**

Dry-joints on R4059 (15k $\Omega$ ) on the power supply panel are becoming a problem with this chassis and can result in a blown BU208 line output transistor. **D.B.**

### **ITT CVC45/1 Chassis**

This set would trip ten seconds after switching on. The delay threw suspicion on the line output stage – maybe the tripler was faulty. Sure enough disconnecting this stopped the tripping, but a new tripler failed to provide a cure. It was next assumed that an excess current rip was operating due to some other fault in the line output stage. Turning down the brightness and contrast controls stopped the

tripping, so the service manual was consulted. This revealed that the set doesn't have an excess current trip, only an over-voltage trip. As the h.t. was correct at 127V it seemed that there was a fault in the trip circuit. Removal of the chopper drive panel revealed a couple of likely looking resistors in the trip circuit. When R806 (470k $\Omega$ ) was removed it was found to read 594k $\Omega$  while R809 (220k $\Omega$ ) had risen in value to 4.3M $\Omega$ . Replacing these two resistors cured the fault but left us with the puzzle as to why disconnecting the tripler had stopped the tripping. We can only assume that the reduced line output stage loading affected the supply to the trip circuit. **M.D.**

### **Decca 80 Series Chassis**

Here's a warning for some of you. The set was dead with a blown mains fuse. No shorts could be found so a new fuse was tried. At switch on the line output stage showed signs of distress and the fuse blew. Without doubt the tripler was faulty, so I proceeded to disconnect it from the nipple on the line output transformer overwinding. Guess what? The nipple fell off, so a new line output transformer had to be fitted free of charge. So be warned: use only light pressure when applying the soldering iron to the joint to remove the tripler connection from the transformer. **M.D.**

### **Philips TX Chassis**

The fault with this set was field collapse. It's not uncommon with these portables and is usually due to the field scan coils being open-circuit. Sure enough there was no continuity across the coils, but a closer look revealed that the wires connected to the scan coil pins had broken off. New wires were very carefully soldered on to the copper wire, then on to the pins, providing a cure. It seemed that the set had been dropped: the cabinet was slightly cracked and the vibration had probably jolted the scan coils, causing the wires to snap. **M.D.**

### **Grundig 45in Projection TV**

A local pub asked us to look at this set which was reported to have a very poor picture. After taking a look I can only describe the picture as being like that produced by a G8 with a dud tube. The picture was very dull and

# Dog Watch

**Les Lawry-Johns**

Most of you naval types will recognise the name Dog Watch. There are two Dog Watches, from 16 hundred to 18 hundred hours in the afternoon and from 18 hundred hours to 20 hundred hours. These are the only two-hour watches, the others – middle, morning, forenoon, etc. – all being four-hour watches which can seem an awful long time apassing. You don't like naval terms? Well what about Gunscrew – Guns Screw not Guns Crew. It's true, or was true.

What's this all about? Well, I've come to the conclusion that we need a Dog Watch here (and there). You see just before Christmas Honey Bunch bought, amongst other things, a nice three-pound gammon steak. After boiling it she put it on the table to cool off, then popped into the shop next door to natter to Dianne and get some cigarettes, dog food, etc. I said natter to explain why she was away a while. I was working on a set at the time and was fully occupied. When she came back and went into the kitchen I heard her say "where did I put it?". It wasn't in the fridge and it wasn't in the cooker, but the dogs were licking their lips – or rather clearing their teeth. When we realised who the culprits were we had a good laugh at the thought of how thirsty they were going to be. They were, and drank gallons during the afternoon watch. When H.B. told Dianne she said we were lucky: her dogs had eaten the turkey. Subsequently our lot pinched a one-pound cheddar cheese. So Dog Watch it's going to have to be.

## Back to Work

Now to the TVs. We've had a lot in lately. Lots of nice easy ones like G11s and T20s, but some have been a pain in the neck – mainly TX10s. One in particular got me down, and I do mean down. It was a late version, with the plastic chassis wrap – PC1560 main panel. When switched on it tripped for about ten seconds or so then went dead. During the tripping I could see the tube's heaters lighting up and going out, and the sound came on in sympathy. This seemed to rule out the focus unit, which is the most common failing with this chassis, but I disconnected it anyway. The tripping continued. I replaced R813 (121k $\Omega$ ) which is another common cause of tripping but this wasn't at fault either. I then earthed pin 8 (error input) of the TDA2582 chopper control chip IC801. The tripping continued, at a subdued rate. Changing IC801 made no difference so I followed the "pull out plugs" routine. This didn't make any difference either. I remain confused.

## The Fidelity CTV140

This portable also got me going. We sold quite a lot of these so I took on the repair without a second thought. It seemed to be dead when I plugged it in so I thought the power supply was at fault. It wasn't. When I plugged in an aerial the sound came out loud and clear and I realised that this model has the advanced noise suppression which the earlier models didn't have.

I checked the tube base voltages and found that the first anode voltage was low. On this model it's derived from

the line output transformer which has two knobs sticking out, the upper one for focus adjustment and the lower for the first anode supply. The tube's heaters also appeared to be underrun. I suspected the transformer, as the e.h.t. and focus supplies were correct but the other supplies derived from it were all low. The line output stage itself seemed to be working all right, so without further ado I removed the transformer and fitted a new one. The same conditions continued and I could see that with the station tuned in the screen was not completely blank. I turned up the presets on the tube base and obtained an acceptable picture, though somewhat lacking in attack. So the whole thing seemed to revolve around the low first anode supply. The RC network on the tube base was in order but the heaters were also definitely low and I just couldn't find a common cause.

I shorted out the 1.8 $\Omega$  resistor in series with the heaters and this improved things a bit. The owner returned and said it was the best picture he'd ever seen on the set, but I was left feeling guilty and inadequate. I'm getting too old to think straight. The doctor says it's vertigo and suggests that I stop trying to do complicated things, but I hate the thought of giving up and I can't afford to anyway. Plod on.

In fact the set came back within the hour, the picture having faded right out. This time there was no first anode voltage and the previously checked decoupling capacitor (C201, 0.01 $\mu$ F) on the tube's base panel was found to have a heavy leak. Removing it restored high brightness and the base panel presets could be returned to their original settings. My guilt vanished, to be replaced by shame. To be fooled by a stupid capacitor, just because it didn't record a leak. Wait a minute, what about the tube heaters? Oh well, the picture was good.

## The Fidelity CTV14

I'm sorry to keep on about this model but if you haven't had much to do with it the chances are that you will. These sets are giving a lot of trouble and the more you hear and remember the better equipped you'll be. The original CTV14R is particularly likely to give you heart-ache because of the oft repeated chain reaction. Here's an example.

The set came in because the line output transformer had been shorting. In addition to the transformer, one must expect quite a few other things to have suffered. We found that the line output transistor was short-circuit and the 10 $\Omega$  h.t. smoothing resistor R828 was open-circuit. This is a very common occurrence and we've mentioned it before. Replacing these items was only the start however. First the chopper transistor TR13 (BUX84 or BUV46) was short-circuit. When we switched the set on after fitting a replacement it coughed and spluttered and through it all we saw that there was no field scan. A new TDA1170 field timebase chip was required, and fitting this took a bit of patience. When it was installed the tripping continued but we could now see a full scan trying to appear.

Careful adjustment of the h.t. preset stopped the tripping and a bright blue raster appeared. We tried resetting the blue gain and background controls but this made little difference. The voltage at the base of the BF460 blue output transistor TR10 on the tube base panel was 6V while the bases of the red and green output transistors were at the correct 2V. We felt really fed up because this meant that the 28-pin TDA1365 colour

decoder chip was faulty.

This chain of events is not unusual and we often find that the rectifier diodes fed from the line output transformer are also short- or open-circuit. Quite often the customer is not prepared to meet the estimate and doesn't believe that all this can be caused by a faulty transformer. It's true though, it's true. I wonder what else we could do for a living?

## Letters

### THE FERGUSON 3787 AGAIN

Here's a further note on trouble we've had with the Ferguson 3787/NordMende 8180. Random tripping and failure to start up can sometimes be caused by dry-joints on the combi coil UA01 and/or the line output transformer UA02. Resoldering the PCB is not enough: it's necessary to remove these components from the board and also to resolder the wires at the tops of the pins.

A point about my article on these sets as it appeared in the October 1986 issue. In the section on fault finding the comments on the line output transformer's top core section were edited to say that the result of it being missing is low voltages from the transformer. This is not the case. Without a complete core the set will either not work at all or fast tripping will occur. Even a wider than normal gap between the core sections results in no-go or tripping.

Colin Boggis,  
Woking, Surrey.

### SONY SLC30

In the January VCR Clinic Martin Pomeroy commented on the problem of beat patterning experienced with the Sony SLC30. His suggestion of adding a resistor in the UN12V line merely masks the fault however. The cause of the fault lies in the power supply. We've had this problem on several occasions and have each time found that the cause is C319 on board PS23. This capacitor decouples the UN12V line.

R.E. Foster,  
Nottingham.

### SOFT-START – AND REMINISCENCES

Whilst browsing through some back numbers I spotted D.R. Bracknell's suggestion in the September 1985 issue for adding soft-start to the Philips G8 chassis. Having two of these sets (22 and 26in.) I made a couple of these circuits up. One set sprang to life but the other didn't – it was necessary to add several components to the power panel to make the circuit compatible (there were several versions of the G8 power supply – editor). The h.t. still rose rather too quickly for my liking however. The rise was made more sluggish by changing the value of C2 to 4.7 $\mu$ F instead of 1 $\mu$ F. This appears to work well.

I've also noticed a few letters recently on the "old days". This has prompted me to recall my own early experiences – perhaps they will stir the memories of a few others.

In March 1952 my late father drew my attention to an advertisement for the then *Practical Television* in a daily paper. It said "Build a TV set for under £20". This

referred to the Argus, a 21-valve set using an ex-government VCR97 radar tube which gave a green and black picture measuring about 4 x 3in. I'd always been interested in electrical things, but at fifteen the only previous project I'd attempted to build had been a 4W amplifier described in *Hobbies Weekly*. My attempt to solder it together was done with a small fire-heated iron, so I think it must have been my father's apparent confidence that led me to send for my first *Practical Television*, which contained a free blueprint, then to build the set.

My father owned a car repair garage and I constructed the set on an unused bench. As far as I know there weren't any kits for this sort of project and the Argos was built on five separate chassis that were bolted together. I purchased aluminium sheet, bending, drilling and hand cutting/filing all the valveholder positions etc. I doubt if it would have gained many points for neatness. Not surprisingly in view of my lack of experience the set didn't leap into life for some months (it may have been years). Many of the valves and components were not new and the EF50 valves had short pins that made poor contact. The hand-made H aerial was also blamed – two strong men were needed to erect it. Quite honestly I hadn't a clue about what to expect and which knob did what as we didn't own a TV set. I'd also hand-wound the coils. I eventually bought a set of ready-wound coils and rebuilt some of the chassis using new components including some much posher "Red Sylvania" EF50s. This produced quite good results. I never did make a case, and the set sat on a table around which the family watched. It was occasionally necessary to twiddle a coil former with a knitting needle when the sound wandered.

The mains transformer was a big beast giving 425-0-425V at 200mA. The e.h.t. transformer was also deadly, giving 2.5kV at 5mA. I still have a lot of the constructional data, the blueprint, the transformers, valves and the e.h.t. smoothing capacitors.

In that same year, 1952, there were details of a £9 television using an ex-type 62 indicator unit. In 1953 came the "PT Supervisor" and in 1954 a 13-valve set called the "Simplex". The latter could be built for less than £16. In May 1954 there was mention of the TV licence fee having risen from £2 to £3 . . .

John F.J. Kendall,  
Herne Bay, Kent.

### INTERFERENCE AND VCRs

In the December issue J. LeJeune commented on interference problems with VCRs. During the six-seven years I've been working with VCRs the only problems of this sort I've had have been striations down the screen on playback and herring-bone type interference. If the VCR is mounted beneath the set the first problem can be cured by fitting a sheet of aluminium cooking foil beneath the TV set, i.e. under the top shelf of the TV plus VCR cabinet. This has worked in every case we've had. In our area the second problem is caused by co-channel interference – the main transmitter here (Caradon Hill) uses channels close to the one used by most VCR modulators. The interference can thus be cured by adjusting the VCR modulator. These two simple methods of dealing with interference problems don't require removal of the top, bottom or sides of the VCR.

A.R. Lloyd,  
Plymouth, Devon.

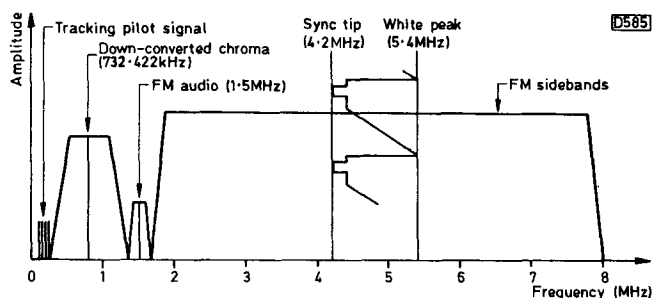


Fig. 8: Video 8 system signal frequency spectrum.

Fig. 8 shows, the carrier frequency is somewhat higher than normal, deviating between 4.2MHz (sync tip) and 5.4MHz (peak white). This upward shift of the f.m.

carrier and its sidebands is facilitated by new head and tape manufacturing techniques, and leaves room at the bottom end, below the lower vision sideband, for the audio f.m. signal centred on 1.5MHz and with a bandwidth of 200kHz. The chroma signal is down-converted in the usual way and then added to the f.m. luminance signal which acts as an a.c. bias for the chroma. The chroma spectrum is centred on 732.422kHz, with a maximum bandwidth of just over 1MHz. This leaves room at the lowest end of the recorded frequency range for pilot tracking signals that are similar in frequency and purpose to the DTF (dynamic track following) signals used with the Philips V2000 format – indeed it was Philips who proposed the use of this technology with the Video 8 system. We shall be examining the operation of this part of the system in a later instalment.

## On the Pill

**Les Lawry-Johns**

Yes, I'm on the pill and it hurts. Why? Because when you're taking Stemetil you have to knock off the booze. No whisky . . . it's murder! I must admit that I cheat a little, sort of forget to take the damned things and take my proper medicine instead. Why Stemetil? Because I tend to topple over when I'm sober, and that's not nice when you're carrying a TV set. The other effect is that my mind is muddled every now and again. This tends to get me into trouble with the customers who think I'm taking the mick because I look past them and forget what I'm saying. Never mind, I can't expect to be clever all the time. It's my heart you see: hasn't got the heart to pump enough stuff up into my brain, causing vertigo or something.

### The Murphy V1400

This small monochrome portable was made in Japan. It was brought in suffering from a faulty tuner. This is of the rotary type and I didn't have one in stock. So I removed the top cover and inspected the interior. Movement of it either lost or restored reception so I checked here and there for dry-joints, noting that the voltages remained correct. I found that the spindle produced the greatest effect.

The spindle carries the tuning capacitor vanes, as with the tuner in the Thorn 1500 series chassis etc. So I attacked it by spraying the spindle clips to remove the grease, and made sure that the earth contacts were good. After this the tuner performed well and couldn't be made to play up at all. I just thought you'd like to know, because it's a repeat of an old story we all know so well.

### Fidelity LOPTs

David Botto wrote recently (September) of having had no trouble with the line output transformer used in the Fidelity ZX3000 chassis. They've been a nightmare here. I've had dozens sparking over. When this happens various i.c.s are dealt a death blow. When the TDA2578 timebase generator chip is killed the symptom, after replacing the transformer, is no raster. This is because the field oscillator has died. Since the fault could also be due to the colour decoder chip a simple check is to apply 4.5V

(approximately) to the top preset on the tube's base panel. This should reveal a single blue line if the TDA2578 is at fault. Having said this it will probably be the field output chip that fails next time. So far we've not had this i.c. fail.

This behaviour is in direct contrast to the earlier ZX2000 chassis, where the line output transformer's habit is to develop a short between windings with the result that the 10Ω h.t. smoothing resistor R828 goes open-circuit. This is usually the end of the story. If R828 holds out too long or a higher wattage resistor has been fitted (2W is correct) the chopper transistor TR13 (BUX84 or BUV46) could well fail, perhaps taking with it the 39Ω resistor R826 which is just inboard of it (rear left). This resistor, which is part of the damping network across the chopper choke, is essential to the correct working of the chopper transistor. I have spoken, and having spoken will now move on to something else.

### The TX10

Do you recall the TX10 that had me by the short and curlies last month? I did do it in the end and feel thoroughly ashamed of myself. I'd removed the plugs in the order suggested in the manual, but the tripping had continued. I'd replaced the chopper transistor and its control chip, also the 121kΩ resistor (R813) that's so often talked about. The tripping had continued. So I sulked.

Some time later I thought I'd have another go and went through the same routine – plug removal etc. The tripping stopped when the scan coil plug was removed. This surprised me because it hadn't last time. So like a fool I hunted through the line output stage, checking this, that and the other and getting nowhere. Then a thought struck me. Before replacing the chopper I'd altered the setting of the h.t. control. I hurriedly set it up again and the tripping stopped. A nice picture with nice sound. It's the vertigo you know.

### Remember Jason?

Nearly five years ago, in the June 1982 issue to be precise, I wrote about Jason the wonder dog and the Dynatron owned by Mr. Daines. Well Phil who pops in on Saturdays to pick up a few things (like TV sets) and to put me right now and again was sorting through some old copies of *Television* he'd not seen. He was reading the June 1982 issue and enjoyed the bit about Jason putting me right on the Dynatron. At this moment the phone rang. It was Mr. Daines. After five years his set had gone

wrong again. He'd moved (a bit nearer, as it happens) and is now resident at Park Avenue. I said I would call next morning (Sunday) to restore his field scan but it didn't at the time dawn on me that this was Jason's owner and that it was the same Dynatron. To be certain that it was a G11 I checked the model number (CTV55) with the list. It certainly was a G11, and I was quite happy. Then I realised who it was – and here was Phil sitting reading about the same set and dog.

Next morning I packed my gear and selected a spare timebase panel – without checking it closely. I sped out to Park Avenue and looked for the large house that lay back. Having found it I was most impressed. Mr. Daines came out to meet me and we went into this very nice house where we were greeted by Jason, his tail wagging and eager as ever to tell me what was wrong with the TV set. He led me over to it and barked when I turned it around.

I removed the rear cover and switched the set on. A white line appeared across the screen so I turned down the brightness. I checked the voltage at the upper left side (field timebase supply) to ensure that the fuse was intact. It was, and I could see that the TDA2600 field timebase chip's holder was feeling ill. To save time I removed the panel and fitted the one I had with me. The field scan was now full, but the picture was marred by patterning and was rolling. Jason barked because he could see it wasn't right. So I took the panel out and looked at it closely. At

some time it had been subjected to rough handling and was cracked at the top and bottom corners where the holes are.

It seemed best to repair their panel by fitting a new i.c. holder. I searched through my boxes but couldn't find one. I'd not packed one because I'd thought a spare panel would do. Idiot. I'd done the wrong thing again. I should have repaired the cracks in the spare panel, but I didn't. I removed the holder instead and it shed its legs. I had to tell Mr. Daines I'd been a fool and that I'd have to go back to the shop to get the part required.

So I left things as they were and drove back to the shop, to be greeted by loud barks from Tessa and Zeb. They knew another dog had been around me. Only Spock was quiet. I selected the right holder and sped back. It was fitted in a thrice and the set received its own panel back. A good, clear picture was obtained. Jason wagged his tail and Mr. Daines wrote out his cheque.

Back at the shop Fred Cole was waiting with the G8 he'd bought from me some ten or eleven years earlier. The picture could hardly be seen so I reactivated the tube and adjusted the presets to get a good picture.

"Well done Lawry" said Fred. He always calls me Lawry. Lots of people do. They seem to think it's my Christian name. Never mind. We were now clear and could get washed and brushed and have a drink upstairs before dinner. I hadn't taken the pill. I'd forgotten again.

## Micro Clinic

*Reports from Nick Beer  
and Roger Burchett*

### Commodore 64

We've had several of these machines in with a defective 6510 chip. The symptom is a blank, black raster. Be patient after you've replaced the 6510. After switching on it can take up to five seconds before that black raster clears to give the Commodore prompt. You may switch on, see the black raster, switch off and think you've not cleared the fault.

Intermittent black streaks across the picture, which intermittently blanked out, was traced to the 8501 VIC chip. **N.B.**

### Sinclair Spectrum

A blank, black raster – slightly snowy on two occasions – has been traced to a faulty 6C001E ULA chip.

A thin liquid had been tipped inside one of these machines that was brought to us – it had run considerably. The customer accepted a large estimate so I set about putting it right. First I replaced the usual faulty transistors (ZTX650 and ZTX213) in the 5V regulator circuit, also the coil. All the 4116 RAMs had internal short-circuits (shown up by the fact that they got very hot very quickly). After replacing these the machine still didn't initialise. The CPU, ULA and ROM chips were all found to be faulty.

Sinclair power supplies give a lot of trouble. Leads and plug problems are cured by replacing the whole lead – a five minute job and the leads cost less than a pound. Several of these machines have come in where the lead

has gone short circuit and the diodes have caught fire, burnt the panel and the only economical answer has been a new unit – they are clearly not adequately protected.

Don't forget the thermal fuse on the primary of the transformer when servicing these! **N.B.**

### Commodore 1571 Disc Drive

A Commodore 1571 disc drive intermittently wouldn't read from the disc. The trouble was due to an intermittent lead between the computer and the drive unit. **N.B.**

### Amstrad PCW8256

We are beginning to get PCW8256 word processors back with power supply faults. The raster produced is small and the STK7308 chopper control chip IC5001 screams. All is returned to normal when the i.c. is replaced.

Although sales of Amstrad machines have been good we've had few faults. One that does crop up from time to time is misadjusted heads on the cassette units, such as the CPC464. We suspect that these have all been "adjusted" by their owners. **R.B.**

### Commodore 64

Hear tearing out time: a Commodore 64 wouldn't load from a 1530 (Taiwan made) data cassette. The head was slightly worn but fitting a new one made matters worse – now programs couldn't be found at all. Just to be perverse I fitted an old, worn head which had across it a groove that was plainly visible to the naked eye. We could now load some of the programs before they crashed! If you come across this apparently absurd reversal of what you'd normally expect look at R6 on the cassette. It should be 2.2MΩ but some were made with 220kΩ. I have to admit to some hours wasted and a bad night's sleep on this one. **R.B.**

# The Return of Madame Martine

Les Lawry-Johns

Some while back I wrote about a seaside fortune teller who warned me about the blue tant. I mentioned that a while later I delivered a new set to a customer who was a friend of mine. As we were watching the golf the colour faded out – Bob didn't notice this as his hero was in a bunker. I related that I'd traced the fault on the decoder panel and that it turned out to be due to a blue tant. Time passes, and alas poor Bob has passed on. But the memory remains. Last Saturday as I was working on a set on the bench an old girl came in. She looked at me and I had this feeling I'd seen her before.

## Good fortune is coming

"You've a lucky face. Good fortune is coming to you."

"It's about time" I commented.

"Be patient" she said, "good things are worth waiting for."

"I've been waiting for years dear, and I'm still scratching a living mending these things."

"Give me your hand and put a five pound note on it. I will reveal all."

I looked at her hard. "I have to work to earn five pounds. Often for a bloody long time. You want five pounds for a couple of minutes' waffle?"

"It's not waffle: it's the truth and you'll see later on."

It dawned on me whom I was talking to. The blue tant lady. Oh dear. I whipped a five pound note from the till. She whipped it from my hand like lightning. She then grabbed my hand and traced lines down it to my wrist.

"You've a long life and a happy one. It wasn't always so. You were unhappy some years ago but that's behind you. You're happy now and good fortune is coming to you soon."

"As soon as it came to you?" I queried.

She gave me an impatient look. "Now screw thirty pounds up and put it on your hand. I'll put the crystal ball on it."

I scraped around until I had found thirty pounds and screwed it up as I was told. She stroked my hand.

"Now you wouldn't begrudge me that small amount, would you?"

"Oh yes I would" I snapped. "You've already conned me for a fiver. Make do with that."

Her attitude changed immediately. "You're mean, that's what you are. Begrudging an old woman an honest living. You'll regret it."

Just then Phil came in and she started on him. He too parted with a fiver and she told him he'd marry a girl with an M and an L in her name. Phil's loved one is called Sarah. Oh well. How easily we part with our hard earned cash. Seeing that she wasn't going to get any more she departed, saying as she went "beware the white cap".

The next witch on the scene was Honey Bunch.

"You dozy oafs, parting with a fiver each to that old hag. She can't tell fortunes but she seems to be able to grab them off fools like you two. I can tell fortunes better than she can any day of the week."

She can too. Sometimes when she holds something of mine she can say what's going to happen next, and she's always right. But I don't want any of you lot calling here to have your fortunes told. If you do I'll be the one to tell them.

## Universal triplers

Do you remember me telling you about Keith from Pompey who called to bring me some scan coils I didn't need after all? While he was here I sold this chap a universal tripler to fit to his CVC30 and told him to join the diode and earth leads together to the earthy side of the focus control. The right and proper thing to do... with the ITT set. Keith had commented that the tripler wouldn't last long connected that way and I'd wondered why.

Well the other day I had a call-out to fix a G8. It needed a tripler and I didn't have the G8 one with me, so I dug out a universal tripler and trimmed the leads, soldered the cap on, etc. I joined the diode and earth leads together and soldered them to the clip. On switching on there was a humming noise and very little e.h.t. The new tripler was getting hot. I switched off and clipped through the diode lead. Everything then came on fine and I felt daft. You see I'd always fitted the original Philips type tripler in a G8, never having had to use a universal one before.

When I got back to the shop I looked up the leaflet and it clearly tells you to trim off the diode lead and insulate. Connecting the diode and earth leads together on the G8 had meant that the clipper diode had no load. Sorry Keith, I was right about the ITT, but wrong about some of the others. I didn't know the G8 was amongst them. I'm amazed at the things I don't know. And a little bit ashamed.

## Washers

A set fitted with the Philips CTX chassis came in the other day – I think it was the E version. The chopper transistor was faulty so I fitted another without trouble and checked around to see whether there was a cause for the chopper's demise. There was. The line output transistor was short-circuit. I decided to use a BU508A but found that the original transistor didn't use an insulating washer, being solid plastic. So I had to fit a washer in order to use the BU508A. Why's this worth mentioning? Restricted space, that's why. I had to use a pair of tweezers to fit the transistor and washer in position – the gap between the line output transformer and the side wall is about half an inch. The chopper needed the same treatment, but in this case there was plenty of room.

Talking about washers, the rubber ones used in the Ferguson TX100 chassis are beginning to give trouble. Apparently they tend to puncture, probably due to slight irregularities in the surface of the transistor or the heatsink. I thought I'd pass this on to you in case you have one of these sets and are puzzled by the transistor being all right but an obvious short being present.

## The white cap

I know you thought the white cap would probably be an 0.47 $\mu$ F, 1kV type living in a CVC5 or something like that. Well you were wrong. It lived on the head of a pretty girl who, believe it or not, popped into the shop to tell me I'd



a lucky face and would live a long time and would have good fortune. She looked at Phil and asked him to go away. She then said in a low voice "don't trust that man, he's after your business."

I called Phil back and we had a bit of a laugh. Phil said to the girl "you don't happen to know Madame Martine by any chance?"

The girl looked sort of funny and replied "she's my grandmother and told me this gentleman was generous. You are dear, aren't you?"

"Sorry dear but this drain on my hard earned cash is

getting a bit much. Would you take a couple of quid and clear off like a nice girl now?"

"That won't help me. I need folding money."

"Well you'll have to clear off without then and leave me to earn my dishonest living."

"It's only he who stopped you giving me a tenner. I know. I'll see you again."

And she went, white cap and all, leaving me a little uncertain and a little bit angry at the way some people expect to be able to make a living. I suppose I'll have a lot of bad luck now . . .

# **Servicing Mechanical VCRs**

## **Part 3**

**Mike Phelan**

In conjunction with the pinch roller the capstan drives the tape along the tape path at a constant speed. It forms part of the drive train, and a rather important part at that. Due to the critical mechanical tolerances it can give a lot of trouble.

### **Capstan Drive System**

Fig. 1 shows the capstan drive system in detail. The motor is mounted in an inverted position below the deck, with the pulley protruding above. A short flat belt goes from this pulley to the relay pulley, which runs in ballraces. The lower part of this pulley drives the capstan flywheel via a flat belt: it also provides the power for the reel idlers, via a square section belt. We'll deal with the latter part of the mechanism in a later article.

The capstan itself consists of a hardened, ground steel spindle which is pressed into an alloy flywheel – see Fig. 2. The spindle runs in a sintered bronze bush and to form a lower bearing there's a polypropylene plug in the retaining strap on which the rounded lower end of the spindle runs. A plastic oil fence is pushed on to the spindle above the bearing to prevent oil from the bearing creeping up the capstan spindle and getting on to the tape.

There are one or two slight differences here between models. The original 3292 capstan ran in ballraces and had no lower bearing. In the 3V16 the lower bearing is in the form of a plate rather than a strap, to carry the PCB with the capstan servo tacho printed coil. This is why the other models appear to have a few spare pillars on the deck. With the exception of the 3V16 the machines have two magnets in the flywheel rim and a pickup head on the deck chassis, the servo being a simple speed control system which compares the capstan speed with a crystal frequency (Models 3V00/3V22) or a tuning fork (Model 3292).

### **Solenoid Operation**

It may be worth mentioning that the portable Model 3V01 (an excellent though heavy machine) employed a very similar deck mechanism, the main difference being the way in which the stop solenoid operates. On the mains models the stop solenoid and the pinch solenoid (except for the 3292) have two windings. One consists of a few turns of thick wire and is supplied with a short, heavy current pulse to pull in the armature. The other winding consists of many turns of fine wire and is subsequently energised to hold in the solenoid. This arrangement

avoids the need to pass a heavy current through the solenoid for any length of time. Even this system would not be really suitable for a portable machine however, as the power required to operate the stop solenoid under stop-start conditions would load the battery excessively.

The solution adopted with the 3V01 is to have a small solenoid with one winding and allow the inertia of the flywheel to do the work! The flywheel rim is castellated, and when the stop solenoid operates the pivoted armature engages with the castellations. The flywheel rotation moves the armature at right-angles to its original direction of travel and operates the stop mechanism. Similar in fact to the autostop arrangement on many audio tape decks. Later portables use a permanent magnet as a hold for the solenoids.

### **The Pinch Roller**

The pinch roller is another very important part. It consists of a rubber covered brass tube with a tiny ballrace within. The circumference is ground to extremely fine tolerances. Fig. 3 shows the way in which the pinch roller is attached to a steel pin mounted on the pinch roller lever. The loading mechanism moves this lever almost into position, the final movement being provided by the solenoid. Except, that is, for the 3292: this model has no pinch roller solenoid, the roller being moved fully into position by the mechanism, the pause key pulling it back against a spring.

### **Routine Maintenance**

Most of the components mentioned here form part of the regular maintenance schedule. All the belts should be removed and cleaned and if necessary replaced. Clean the pinch roller (it's safer to remove it first). Don't use any downward pressure when removing or replacing the pinch roller screw – the lever is easily bent and this can give rise to all sorts of problems. Clean all the pulley surfaces, paying special attention to the brass part of the relay pulley – this seems to have a greater affinity for belt material! To remove the capstan belt it will of course have been necessary to remove the lower bearing strap or plate. This will enable you to remove the capstan assembly – take care that the oil fence doesn't get mislaid.

Clean the capstan spindle and apply *one* drop of oil near the bottom. You'll have to clean it again after replacing it, in case any oil has been picked up during its passage through the bearing. On the 3V16 you'll also have

# Mr Doublecheck and Mrs Tart

Les Lawry-Johns

We've had some odd ones in here recently, and they're getting odder. Take Mr. Doublecheck for example. He's from some east European country and his use of the English language is on the quaint side to say the least. He carried in an old Ferguson record player with a BSR deck.

"It doesn't speak properly."

"Right oh! sir, we'll make it speak properly. Call for it tomorrow."

"No, I'll call for it on Wednesday" – which was tomorrow.

So we got down to it. The stylus had no tips and on auto it didn't land in the right place. This was seen to and the next item was that the turntable made a grinding noise. So we oiled the centre spindle then saw to a couple of other points. It now played *La Boheme* beautifully in rich Italian. Jim Reeves sang in rich English.

He came back the next day and asked to hear it working. So I plugged it in and put on *La Boheme*.

"It still doesn't speak properly."

I snatched off the record. Jim Reeves now sang in English.

"Ah, now it speaks properly – but what's that noise?"

I listened very carefully and turned the sound down. Yes, I could just hear a faint thump I'd not noticed before. I took off the turntable and inspected the rubber drive wheel. This had a slight dent where it had been in contact with the spindle and left there motionless for some time. I selected a new one from the shelf. It now played without the slight thump. Jim Reeves sang again and Mr. Doublecheck nodded cautiously. He produced a length of lead from his pocket, and a 13A plug.

"Put this on for me. My landlord doesn't like me doing these things."

I sighed and fitted the plug.

"How do I run my light and record player from this?"

"You put a socket on the end of the lead and fit a two-way adaptor."

"You do this for me. I don't mind waiting."

So I fitted a socket and supplied an adaptor.

"Thank you. I'll bring the money in tomorrow."

## Mrs Tart

Some time later a tall, fashionably dressed lady came in carrying a 12in. monochrome portable. She spoke in a very la-di-da manner, obviously not her usual voice. I wondered what she had to hide.

"I've been given this TV set for my son to use in his room. The picture's very dark. Can you do something about it?"

I said I'd do my best and that she could probably have it later that day. Left alone I tried the set and found that the whites were silvery, suggesting that the tube was low or underrun. I checked the heater supply and found it to be 12V near enough. All the other tube base voltages seemed to be right except for the first anode voltage which was under 200V. The manual didn't specify what it should be so I checked the resistors and capacitors in the circuit and found them to be within specification. I reactivated the tube and was rewarded with a nice clear picture.

When Mrs. Tart returned I showed her the picture.

"Oh yes. That's a little better – but not as good as that one there."

She pointed to the TX9 14in. colour portable which had a needle-sharp picture and was for sale.

"That's a beauty" I said proudly.

"Is it for sale?"

"Yes indeed. It's eighty pounds."

"Will you take weekly payments? Say 50p a week?"

"No madam, I'm afraid I can't."

"Well, how much is my little portable?"

"Five pounds, madam."

"That much? I can't afford that much."

"Well take it away and don't come back any more."

"I don't mind giving you a pound."

"Just take it and go, *please*."

So she went, in her fashionable clothes and her put-on talk. I must be barmy.

## The CVC30

Next came an ITT colour set with a 26in. tube – CVC30 chassis. For some peculiar reason I didn't tackle it the way I usually do. I checked the h.t. voltage and found none. Next I checked the chopper transistor which was in order. It had –320V at its emitter and base, so it wasn't being turned on. The driver transistor had no voltage at its collector. I put a short across its base and emitter and h.t. appeared at its collector. As a quick check I fitted another CMP30 switch-mode power supply control panel. Still no joy. So I dug out the circuit and studied it. I moved and the edge of the manual touched the upper right EW modulator drive panel. The whole thing then came on and a nice picture appeared. I tapped here and there, hoping to find a dry-joint. I just couldn't make it go off, so I proceeded to deal with the other complaint, intermittent height.

This was an easy one, the fault being on the correction board over the scan coils. There was a nice dry-joint here which I corrected with a short length of wire. The height was now steady and I returned to investigate the mystery shut-down. I couldn't make it repeat its original performance no matter how many times I switched off and on again. The customer returned and I related the sad tale. He expressed satisfaction with the set and carted it off. Next day he phoned to say that it was dead again and he'd be bringing it in.

This time I tackled it the usual way. I tapped the line output transistor and the set came on immediately. The usual dry-joint on the collector tag. I could have kicked myself but got Honey Bunch to do it instead. Not that hard you cruel bitch . . .

The customer carried his set off again and we haven't seen him since.

## How Not to Repair Sets

When Beardy and Non-beardy carried an old Thorn 3500 in I cleared my throat ready to tell them to . . . off.

"We will pay you well to repair this TV for us."

"And guarantee it for ever no doubt."

"No, no. That was just a misunderstanding. You mis-

understood us you see."

"Oh, all right. Leave it here and pick it up later today."

"We'll call for it on Friday morning." Good Friday. Another holiday lost.

When they'd gone I started on the most horrific job I've mucked up for a long time. I think I did everything wrong.

I noted that the red button had tripped, so I checked for shorts and found one straight away. A BU208 had been fitted in place of the R2010 chopper transistor. After a struggle I removed it and checked it with a meter. In the set it had recorded a dead short: now it was clear of shorts. I checked the set again. No shorts. I fitted a new R2010 and switched on. There was a click and some smoke. The R2010 was dead short. I removed it and it was still short-circuit. I called the set some nasty names, removed the power supply panel and fitted a spare. As there were no shorts I switched the set on. It coughed and the 2.5A h.t. fuse failed. I again checked for shorts and found none. What I should have done was to disconnect the tripler, but I didn't, being the fool that I am.

I decided to change the timebase panel. When I switched on the new fuse failed (not blew). Now I

disconnected the tripler, and now the fuse held. I kicked myself (softly, not like H.B. does). I tried again after fitting a new tripler. This time the picture came on but was far too bright: with the aerial out the raster was over bright.

The first anodes were at 800V, but with the controls turned down the raster was still too bright even with the brightness control at minimum. Like a fool I checked the beam limiter panel carefully and found nothing amiss. A check on the grids revealed that they were at the same voltage as the cathodes, well over 100V. A check at the tube bias preset R450 showed that there was no negative voltage here. The feed resistor was all right but there was no negative supply at connector 18/1. It then dawned on me. I'd fitted the new tripler plug without seeing it properly. On inspection only this end was contacting, the far end wasn't even in. I called myself every rotten name I could think of, like the chief P.O. had called me when I swiped his head with my rifle in 1942. Now the picture was good and the controls had to be turned up to their previous settings. I didn't have the nerve to fit the original panels. I just wrapped it up and waited for Beardy and Non-beardy to collect it. They still haven't.

## Cable and Satellite 87

**Harold Peters**

The Cable and Satellite 87 exhibition was held at the Wembley Exhibition Centre on March 26-29th. It was organised by Montbuild Ltd. in association with 21st Century Publishing Ltd., publishers of *Satellite TV Europe*, the space watchers' *Radio Times*. There were over 60 stands in the Centre, the attendant dish farm being outside in the car park.

Although there have been no new satellite launches recently there were nevertheless several items to attract the enthusiast, especially out in the dish farm. Dishes now come in all shapes and sizes, though the 1.5m offset-fed type is almost standard for inclusion with the average TVRO package. A huge 5m dish was receiving C-band pictures from the USA. At the other end of the scale Matsushita was showing a range of light, wafer thin flat-plate aerials with the capability of lateral stacking to increase the gain.

The flat-plate aerial could well be the shape of things to come. It was jointly developed by the COMSAT Corporation in conjunction with Matsushita Electric Works. COMSAT's contribution was the development of what is referred to as a "multilayer planar array structure" that provides high efficiencies (60-70 per cent) over a wide bandwidth – comparable to that of a conventional parabolic aerial. MEW will be manufacturing the aerials and have contributed printed circuit technology and low-cost manufacturing capability. It seems that inside the flat panel there's a phased microstrip array. This technology calls for quite elaborate design work to get optimum characteristics. Matsushita will be marketing a range with dimensions of typically 354 × 20mm and 720 × 20mm. The aerials are expected to be available later this year at prices some 30 per cent higher than conventional parabolic aerials. Large-scale production should see lower prices.

Receivers now come with built-in aerial control. Skyscan offer two handsets with theirs, a simple one for the user and an "all-dancing, all-singing" one for the

person who has to do the programming. Drake dispense with the spaghetti bunch of wires: their control unit can be housed in the garage, with only a single coaxial connection to the receiver(s) in the house.

The broadcasters took a lot of floorspace, each trying to attract a wider audience. The Luxembourg Astra stand attracted most attention, to the chagrin of the MAC-D2 DBS protagonists.

There was some simple test gear too. Handies' precision inclinometer uses a diffraction grating to give an accuracy of 0.2 per cent. From the Cotswolds, Satellite Systems offer the "Squawker" signal strength meter and also a portable site survey viewfinder.

Even with all this gear around we noticed, as we left, a dish being lined up in the old-fashioned way – by watching the output on a portable TV set!



*The Matsushita flat-plate satellite TV aerial.*

# Now Read This

**Les Lawry-Johns**

I'm told that some of you who repair Ferguson videos don't recognise a fuse when you see one. Now I don't care to get involved with VCRs myself but when I was given this information I thought it would be prudent to pass it on, although the majority of you probably know what it's all about already. The point is that the fuses concerned don't look like fuses, they look more like a small diode or a transistor with two legs. They're called Wickman fuses and are rated at 150V. Close scrutiny of the list given in Table 1 reveals that the current rating is obtained by multiplying the type number by 40, for example type ICP-F10 has a rating of 400mA ( $10 \times 40 = 400$ ). Cries of never... Table 2 lists the range of Wickman fuses available from Philips Service, and their code numbers for ordering purposes. I hope you find this of interest. Take a note of it, just in case.

## The Big Roberts

This large set was brought in the other day by two big fellows who puffed a bit. It turned out to be fitted with the Philips G9 chassis, which was bad news for uncle Les. There was about four inches of field scan on the 26in. tube, almost full width, no control of brightness and very little sound. Now as you know the first thing to do with this chassis is to check the condition of C138 (2,200 $\mu$ F) which decouples the emitter of the BU208 line output transistor, serving as the reservoir capacitor for the 42.8V supply. I didn't suspect it of being the cause of the fault conditions but checked it just the same. It was on the way out, emitting thick black fluid. I changed it and tried the set again. Still the same. The BU208's emitter voltage was low at about 20V, thus explaining the poor field scan, low sound, etc. I removed the plug connected to the timebase panel (line oscillator, field timebase, EW correction circuit etc.) and the BU208's emitter voltage rose to 40V.

Like a fool I fitted another timebase panel. The symptoms remained the same. So I concentrated on the line

output panel and found a leaky diode (D176) in the beam limiter circuit. Replacing this didn't alter things one jot and I was getting fed up. After further checks I found that the "lower" diode in the diode modulator circuit, D156 (BYX55-600), was open-circuit. Heaving a sigh, I replaced this and put the panel back in. It worked. Full voltage at the BU208's emitter, a lovely field scan, full control of brightness and good sound. I would have thought that an open-circuit diode in this position would have had a more drastic effect on the width, but it didn't. Something else to remember.

## The Pye 196

This set gave me a bit of a headache. It's a small monochrome portable fitted with the Philips TX chassis. The complaint was that the picture would go off at irregular intervals, leaving a blank raster with slight radio music or talking sounds in the background. To me this meant trouble in the i.f. strip. My problem was that the fault just wouldn't put in an appearance. The picture stayed on for days. Eventually, one morning, the picture did go off, leaving a blank raster.

I leapt at it and found that the voltages at the base and emitter of the first i.f. amplifier transistor were higher than they should have been – about the same as at the collector. If I switched off to check the transistor however the fault would be gone and we would be back to normal. So I followed the base bias back to the a.g.c. amplifier transistor TS351 and found that this had no base bias. Its collector voltage was thus high and the i.f. amplifier transistor TS217 was being turned on excessively. The base of TS351 is biased by R353 (820k $\Omega$ ) which was open-circuit. After replacing this the set behaved itself for several days and the owner was glad to collect it.

The set was used in a caravan and had always behaved for the husband but always gave his wife trouble. She blamed him and he was glad to be out of the doghouse. It's all right for him. I live in one all the time. Tessa and Zeb are good really: it's the cat that leads me a dog's life.

## The Radio Set

This was a killer. A shop (I won't say who it was, Peter) had told this chap that the only place where he would get his radio set repaired would be here. I said I would have a look at it if he brought it in. Shortly after this he appeared with his wife, carrying a small wooden box. His wife explained the trouble.

"When we turn up the volume it screams at us."

I took the back off and looked inside. On the right-hand side there was a tall object which I took to be the dropper. Next to this there was a valve which seemed to be a 6Q7. It was obviously a double diode triode anyway. There were two further valves to the left, both with top caps connected to the tuning gang (two sections). I looked for an output valve and rectifier but they weren't there.

"Did you say this set goes?"

"Yes, but it howls at you."

I plugged it in and switched on. Something flashed and went bang underneath. I unplugged it and removed the chassis screws and the knobs at the front. The whole thing came out, including the speaker. When I turned it over I saw that the mains filter capacitor had disintegrated. So I clipped it out. "We'll fit another if a strong station has a hum behind it" I explained.

I switched it on again and was aware of an obnoxious smell.

**Table 1: Wickman fuses used in Ferguson video equipment.**

Type	Rating	Part no.	Used on
ICP-F10	0.4A	01X0-042-112	3V33/38/39/42/43/45/47/48/49/54/56
ICP-F15	0.6A	01X0-040-407	3V29/30/35/36/38/39/49/50
ICP-F20	0.8A	01X0-086-061	3V46/50
ICP-F38	1.5A	01X0-057-320	3V38
ICP-N10	0.4A	01X0-058-395	3C01, 3V44/45/48/50
ICP-N25	1A	01X0-085-007	3V44/45

**Table 2: Wickman fuses from Philips Service.**

Rating	Code no.	Rating	Code no.
63mA	253 10058	1.25AT	253 10075
160mA	253 10054	1.6AT	253 10046
250mA	253 10071	2A	253 10051
315mA	253 10074	2AT	253 10039
400mA	253 10064	2.5A	253 10082
500mA	253 10041	2.5AT	253 30089
630mA	253 20089	3.15AT	253 10048
800mA	253 30104	4AT	253 10047
1AT	253 10052	5AT	253 10065

Note: T after A indicates time-lag type.

I sniffed around and it seemed to come from the dropper. I looked at it closely. It wasn't a dropper, though it looked like one. It was an old selenium rectifier. I disconnected one end and fitted a BY127. "It won't smell any more" I said.

"The march of time" I explained.

the gang. The stations now came through loud and clear. I turned up the “volume control” and the set howled, so I turned it down for comfortable listening.

"About four feet, connected to a water pipe" he replied.

**“Why?”**

"Yes. Thanks very much."

## ***Product Report: Glue Guns***

For some time now I've been using a glue gun for both field and bench work. It's proved to be so useful that I never venture into the field without one. Traditionally we seem to carry in our kit everything for repairing the set, but seem to overlook damage to the cabinet, knobs and other bits and pieces. Very often a second, wasteful call is needed. With a glue gun in your hand you can eliminate many of these problems.

Glue guns use hot-melt adhesive sticks – many types of glue sticks are available for bonding different materials. I prefer the clear, general-purpose sticks usually provided with the gun. These will deal with most plastics, wood, fabric, paper, etc.

There's no shrinkage of the glue and the bond is ready when cool. The material is a good insulator and can be used as a sort of potting compound.

For around £10 you can pick up an electric glue gun, with glue sticks, and get started. There are two types of sticks: short, manual fed ones and longer, trigger fed sticks. Both types are o.k.

Camping Gaz have introduced a cordless glue gun. One of these (type P500) has been supplied to me for evaluation and I'll be reporting on it at a later date. It's powered by a Camping Gaz CV360 butane gas cartridge which should give around four hours' continuous use. Ignition is electronic, using one small battery. Two of the longer glue sticks (11mm x 210mm) are provided. The catalytic heating system means that there's no naked flame. The gun is good but not cheap at around £35.

You will doubtless find many uses for your glue gun. Here are some of mine.

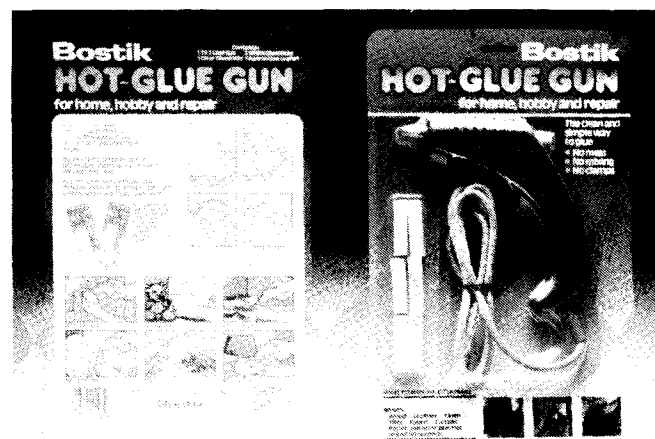
Cabinet repair is where the glue gun really shines – in the field instead of having to cart a set in for repair or even cabinet replacement. Repairs that are possible in the field include: cracked cabinets and fascias; internal damage to plastic mouldings; switch and push-button

The gun can be of great help with older and obsolete sets for which parts are no longer available. Have you ever been to an older set which has push-buttons that go flying across the room when you change channels? No problem with the glue gun!

The above remarks also apply to bench work and refurbishing of course.

Here are some specific uses. With whistling line coils, for example in the Thorn 9600 chassis, a quick squirt of glue will usually provide a cure. This is worth a try on other noisy chokes and transformers. Where an on/off switch has been pushed into the set, breaking the plastic moulding, a new switch can be glued in – allow to cool before testing. When the aerial socket comes away from the cabinet, for example in Korting sets, a glue gun will come to the rescue. In fact the list is endless.

In conclusion, this must be one of the few gadgets that will earn its keep very quickly. With the new cordless type giving greater convenience ever more uses will be found. If anyone finds some good ones, let us know!



*The Bostik thumb-operated hot-glue gun in blister pack.*

# Tiny Tim's Triple Trouble

Les Lawry-Johns

Tim sat behind his bench and looked out at the world, or some of it. Pretty girls looked at the door to get a reflection of themselves – this was apparently their favourite occupation. How could they tell their boy friends they loved them? There just wasn't room. Not till they got older and told their children they were selfish.

It's a funny place this world, thought Tim. Then he realised he was the same himself. It was just that he didn't show it so blatantly. He sort of covered it up and pretended he cared for others. Like Tinker Bell really did – not for Tiny Tim of course, but she seemed to care for others.

His eyes strayed under the bench. How did those books of naked girls get mixed up with his service manuals? Oh yes. He was saving them for his brother who liked things like that since he couldn't do anything other than sit in a chair all day and read and watch videos and things. Tim didn't like these rude books. It was just that he had to make sure that his brother wasn't going to see something that would upset him. Besides, he would have to keep them until Saturday so that Phil could read them too.

## Mr Golightly's K40

Just then Mr. Golightly opened the door and carried in a Philips K40. "It goes off just when it's getting interesting, and my wife's getting fed up with it and with me" he explained.

Intermittent operation. Tim's heart sank. He wasn't keen on K40s as he hadn't had much to do with them as yet – not like the KT3, which he was always pleased to see, with its unreliable tripler and probably a faulty chip or two, or the usual problem of the  $4.7\Omega$  resistor without chip faults.

He removed the rear cover warily, switched on and connected an aerial. A lovely picture appeared and remained. Tim got out the hairdryer but nothing responded to it. He then drew out the lower, centre power panel to see whether heat on this would do anything. Now to get this panel out you have to lower the main panel. Having pushed the power panel back in Tim raised the main panel and the set went off. He lowered it and the set came back on.

"There you are" said Mr. Golightly, "on off, on off".

Tim sighed and peered at the main board closely. A tiny spark caught his eye. Yes, on one of the line output transformer pins. Quick as a flash it was resoldered. "All done Mr. Golightly. See you next year perhaps."

"What? When? Wait a minute!"

Tim moved the main board about and tapped it with the screwdriver handle. "All done. Next gent please."

He wrapped it up and put it back in the car while Mr. Golightly muttered about what his wife would say if it happened again. We haven't seen him since – except when he popped in with half a bottle of Bells for Tim. In fact the poor joint hadn't been cleared that quickly. The pin had been scraped clean before resoldering.

## Tim's Second Trial

When two fellows staggered in carrying a big TV set with doors Tim wondered what it was. It turned out to be

a fairly old 26in. GEC set of the C2110 variety. Tim felt at home with this type of set and had no qualms about undertaking the repair. The two chaps departed, having given their details, and said they would return later that afternoon.

Tim removed the back cover and went straight to the fuse on the upper left side. It had failed but wasn't blackened. Tim fitted a new one and switched on. The sound came on and the e.h.t. rustled up and Tim felt pleased that he had taken this short cut. The fuse then cleared up an failed, and Tim stamped his foot in anger.

He checked the lower centre power unit which said it was in order – the thyristor, the electrolytics, everything. He then checked the line output stage carefully. Again no fault. He remembered Beardy's 3500 and disconnected the tripler, then fitted a new fuse and tried again. The sound burst out but the new fuse died as the previous one had. Tim reconnected the tripler and disconnected the line output transistor. Another new fuse was fitted and this time it held. Tim didn't suspect the line output transistor but changed it just the same. He disconnected all the l.t. lines from the line output transformer just in case then tried again. The fuse failed after thirty seconds. Feeling a bit fed up, Tim tested all the items associated with the line output transistor's base. Everything was in order, but then they would be if the failure occurred only when the set was working. So it would have to be panel replacement.

Tim thought hard, which was something he was not used to doing. What if a replacement panel was fitted? Would they be prepared to pay? Tim put the set to one side.

When the owners (carriers) returned, Tim asked them how much they were prepared to pay for the job. "Somewhere between five and ten pounds" was the answer.

"Clear off" said Tim angrily. So they carried it off and Tim sulked. All that time and worry wasted. He would have to change his ways. But why should he? He'd been doing this job for forty years or so and he wouldn't change now. Oh for a couple of nice G11s.

## Mrs Fidler and the G11

Just then the phone rang. It was nice Mrs. Fidler who lives on the outskirts of town. Tim had sold her a Pye G11 some years ago and this was the first time she'd been in trouble. Nice Mrs. Fidler, a young sixty year old, who had her mother living with her.

"Hallo Mr. Tim. Can you come and fix my telly? The tube's gone."

"How do you know the tube's gone Mrs. Fidler?"

"Because there's a white line across the screen. Our neighbour had the same thing and Snappy Repairs took the set away and fitted a new tube. It only cost them eighty pounds."

"I'll come and see to it Mrs. Fidler, and promise it won't cost you eighty pounds." Tim packed his bags and made sure he had some 800mA fuses, a TDA2600 chip and a chip holder. He sped up the road avoiding the dogs who were chasing a bitch on heat. When he arrived he whipped the back off the set and switched it on. There was a supply to the field output stage so the fuse was

intact. He unsoldered the TDA2600's heatsink and removed it, having checked that the base of the holder had not been overheating and had no dry-joints. The new TDA2600 was fitted and the heatsink replaced. Upon switching on a nice picture appeared.

"Oh Mr. Tim. It wasn't the tube after all."

"No dear. You're not the only fiddler in town I fear."

By the time Tim got back to the shop the phone was ringing. "The white line is back Mr. Tim."

Tim cursed himself. He hadn't checked the 470 $\mu$ F h.t. reservoir capacitor. He sped back, carrying a replacement capacitor and another TDA2600. Tim looked sheepish when he got there. He removed the 470 $\mu$ F capacitor from the power board. It was a red one and the tags were blackened. After fitting the new welded one and the TDA2600 Tim was rewarded with a nice clear picture. "You're lucky Mrs. Fidler. This could have cracked the tube."

"That's what I told you, Mr. Tim."

"I . . . er. Oh, never mind. Just joking. Goodbye Mrs. Fidler. Have a nice day."

Tim slunk back to his little shop and told Tinker Bell all about it.

"I've heard you tell a million people about that capacitor and what it can do. And when it comes to it you don't bother to check it yourself" she said.

"I know, I know. Silly me."

## Wickman Fuses

Oh, incidentally, Wickman fuses (see last month). Ferguson don't call them that. They refer to them as "circuit protectors". They seem to be the same however, like a small black transistor with two legs. But order them as circuit protectors from Ferguson, Wickman fuses from Philips.

# Letters

## THE TX9 THYRISTOR PSU

Gordon Haigh's article on servicing Ferguson TX9 thyristor power supplies, in the July issue, was timely and interesting. Anyone who has to face these sets in the field will welcome the wealth of advice and information given in the article. Although the TX9 chassis was basically very reliable, the PC1001 and PC1040 versions were prone to fuse blowing caused by repetitive spikes on the mains supply at or near the a.c. waveform's zero-crossing point. Ferguson introduced several modifications, mentioned in the article, in an attempt to overcome the problem. These were successful to some extent but the problem of fuse blowing persisted until the arrival of the PC1044 version with its switch-mode power supply.

If the fuse blows while the receiver is working, a replacement fuse restores normal operation and all seems to be as it should be in the receiver it's likely that the cause of the fuse failure is a spiky mains supply – domestic appliances in the same house could be producing the mains interference.

A few years ago an "unofficial" modification appeared. This altered the operation of the power supply in a way that avoided the spiky mains problem. It consisted of adding a second thyristor to the circuit. An outline sketch of the arrangement is shown in Fig. 1. Both thyristors are triggered via transformer T1 and both are fed with mains a.c. at their anodes. Ferguson made the modification

available for the PC1040 board and developed a small modification kit which was issued to some of the more desperately plagued dealers. It can also be applied, with care, to the PC1001 version. The extra 470 $\Omega$  resistors are 1/8W types and the thyristor labelled SCR4 should be of the same type as SCR1. Where W66 is fitted it can be removed: the network C142/R173/W74 across SCR1 can also be removed.

This modification made life a lot easier for many service engineers.

Harold Raven,  
Nottingham.

## THE FLAT SATELLITE TV AERIAL

Publicity has been given recently to a small, flat, wall-mounted domestic aerial for satellite TV reception. It's certainly an extremely appealing idea and has been generally welcomed. For the present and for the foreseeable future however it's likely to remain just a concept. There's no question of a new generation of flat "dishes" suddenly replacing the conventional parabolic dish. In the fullness of time the flat satellite TV aerial will undoubtedly come into its own, but at the moment its development is inhibited by manufacturing costs and the challenge of perfecting viable electronic steering from satellite to satellite.

It's claimed that the cost of a flat dish aerial is thirty per cent higher than that of a parabolic dish giving the same performance, and that a smaller surface area is required for the same performance. This cost figure could be a gross underestimation in view of the fact that the main receiving elements on the flat aerial must be etched to provide 1/4 or 1/8 wave sections with a manufacturing tolerance of less than a thousandth of an inch. The distances between the large number of these sections have to be maintained at an even closer tolerance. In addition, the surface must be kept perfectly flat. If these criteria are not meticulously adhered to the signal picked up by some of the sections may be out of phase with the signal picked up by other sections, the result being phase cancellation.

At its current stage of development the flat aerial, whether mounted on a roof or wall, would need a conventional azimuth/elevation mount and would require the same degree of care in alignment as a conventional parabolic dish. An electronically steerable flat aerial could indeed be mounted in an arbitrary position, but electronic steering is a long way off and is unlikely to be available in

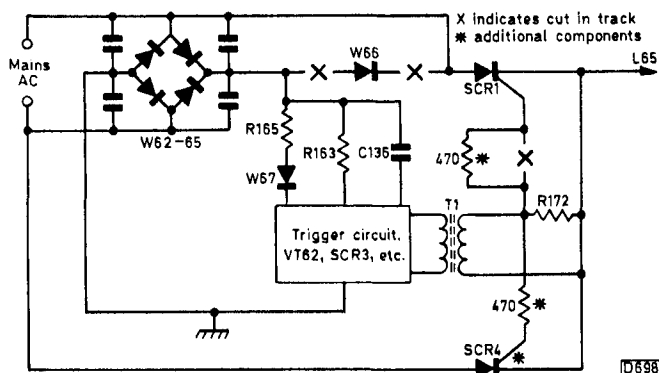


Fig. 1: Thyristor power supply modification for the Ferguson TX9 chassis. Note that in the PC1040 version W66 is omitted and R165/W67 are interchanged.



# Mr Harass and Mrs Corker

Les Lawry-Johns

Mr. Harass originally phoned to say that his Bush T20 was ghostly for the first two minutes or so, after which it was all right. Now I've had this business several times with T20s and T22s, and the cause has been the 47 $\mu$ F electrolytics in the switch-mode power supply. I looked for a spare unit and called out for one to show itself. Nothing doing, so I thought I'd call in on Geoff to see whether he would lend me one and, to be on the safe side, I took a couple of 47 $\mu$ F electrolytics with me.

## Eddy's Advice

I landed at Moon Lane and slipped up the stairs to see Geoff. Having picked myself up, I could hear Geoff laughing and saying to Eddy "the silly old sod can't even walk up the stairs without falling over. Oh, hallo Les. Sure footed as a mountain goat as usual."

I smiled in my usual composed way and enquired about the availability of a T20 power supply.

"Certainly old chap, are you sure you need it?"

Ignoring the implication of this remark or query, I described the symptoms. "Ghostly for the first two minutes."

Eddy spoke up, "You need a tube base socket, not a power supply unit."

I smiled. "Thank you Eddy, but I'll borrow the power supply if I may."

With the unit clutched in my hand I left the shop of doubt and headed for Hollyberry Lane, trying to remember what it was that Honey Bunch had asked me to get from the corner shop next to where Mr. Harass lives. I thought I'd fit the power supply unit first and get the ham later.

"Good morning Mr. Harass. Are you the gentleman with the dicey power unit?" After being ushered into the room where the T20 lived I whipped the set round, removed the rear cover, hooked the chassis into the service position, lowered the timebase panel and had the power supply unit out before you could say dozy. I slipped the spare one in and connected it up. When I'd fitted the aerial and switched the set on the sound boomed out and a picture tried to appear. It was miles out of focus. I smiled a sickly smile at Mr. Harass. "Sorry sir, I'll have to pop it back to the shop for a few minutes, to make it better so to speak."

The T20's own power supply was refitted, the rear cover replaced and the whole lot was then carted back to the shop, pausing only in Moon Lane to return Geoff's power supply.

"Sorry Eddy. You were right as usual. The silly bugger didn't say it was out of focus. Have a nice day."

Back at the shop I removed the faulty tube base socket and fitted a new one. The picture was good from switch on. Only a slight touch on the focus control was required (remember that). In a trice the set was taken back home to beam its lovely picture at Mr. Harass. "LLJ triumphs again" I snarled as I sped back to the ranch.

## Two Days Later

Two days later Mr. Harass phoned again, this time because of sound hum that varied with picture content. I

selected my spare decoder/i.f. panel and wound my way up to his house. Oh yes, I'd forgotten to get the ham last time . . . I listened to the sound from his set and it did have a hum which changed when the scene changed. On fitting the spare panel the hum had gone.

"The picture's nowhere as good as it was" said Mr. Harass.

I adjusted the preset contrast control.

"That's better."

So off I went, hoping to hear no more. Some hope.

Two days later he was on again. "The picture's terrible. Can't see the stumps and can't read the score. I want my panel back."

Now I had spent hours on his panel, painstakingly removing every suspect capacitor and finding it good. I resolved to refit his panel and if necessary swap over the i.f. subpanel and tweak up his focus control. Have you noticed that if you alter the focus potentiometer setting you have to reset it back later? Not every time of course, just nearly every time.

So off we went again. I removed the rear cover and reset the focus control for a clear picture. I then refitted his panel and there was no hum at all.

"Ah, that's better" said Mr. Harass. "I knew that panel you fitted was no good."

I heaved a sigh and left it at that. I hope the focus control holds its contact this time.

## Mrs Corker's KT3

I was busy talking to the dogs, telling Tessa what a pretty girl she was, when the phone rang. It was Mrs. Corker, her with the legs. She'd called to say that her Philips TV set (KT3) was on the blink. In fact it wasn't doing anything except stand there, and it wasn't doing that very well either. I promised to call during the afternoon.

I was greeted at the door by Mrs. Corker, who was wearing the shortest of short skirts. I swallowed hard and allowed her to precede me into the drawing room. She immediately lay under the set and gestured for me to do the same. I've been caught by this one before, and hesitated to tell her I was beyond it.

"Get up Mrs. Corker. We'll turn the set on its side."

She scrambled to her feet, looking I thought a little annoyed.

When the set had been turned on its side I tightened up the loose screw. I wonder who'd loosened it? After putting the set upright I switched on. Nothing.

"It's the switch" she said.

"Funny how all you women say that" I commented.

With the rear cover removed I found that there was h.t. at one end of the 4-7 $\Omega$  surge limiter resistor but nothing at the other end. I removed it and fitted a more manly type. The set now came on but was tripping. After disconnecting the lead from the line output transformer to the tripler the tripping stopped.

"You need a new tripler Mrs. Corker."

"Will that stop the colour keep going off half way through the evening?"

"No dear. That's a little something that can be done in no time and I'll do it before I go."

So I fitted the tripler, taking the diode and earth leads

over the top, and soldered them together where the original single lead had come through, in my usual lazy way. I took out the left upper panel, cleaned the contacts, and refitted it. After switching on I was rewarded with a lovely clear picture in full colour, except for a predominant green which sorted itself out in a couple of minutes.

"What about the colour going off?" asked Mrs. Corker.

"That won't happen again, I promise you. Well not for a year or so anyway."

"I didn't see you do it."

"You were looking at that bird in the garden."

"Oh, lovely, I must give you something before you go."

"Yes dear. Thirty quid."

"Not negotiable?"

"Sorry."

### **The Thorn 9000**

I limped back to the shop and found a Thorn 9000 on the bench. Now I'm not keen on these sets as they tend to play tricks on me. This one had had a new tripler fitted recently. I disconnected this, though I didn't suspect it. Switching on rewarded me with sullen silence, though there was h.t. on the syclops wall. I turned it over and checked the usual places. As all seemed to be in order I disconnected one end of R709, the 47Ω resistor connected between the base and emitter of the syclops transistor. It read something like 10Ω. I pushed the free end through, out of harm's way, and fitted a new 47Ω resistor on the underside (lazy me . . .). The thing then started up, leaving me just to reconnect the tripler. This resistor seems to be really playing up nowadays, but it makes a nice, easy repair. What we need is nice easy repairs. Where did they go?

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## **Teletopics**

### **ALL CHANGE**

Following last month's announcement of the sale of Thorn-EMI's consumer electronics products manufacturing subsidiary Ferguson to the French firm Thomson Grand Public, this month brings news that Thomson has established a major presence in the US consumer electronics goods market by taking over General Electric's interests in this field. General Electric's share of the market increased considerably when it took over RCA in early 1986 – the two brands GE and RCA together form the market leader in the USA, with some 23 per cent of TV sales.

Thorn-EMI has announced completion of the sale of Ferguson to Thomson, the consideration, which includes repayment of loan accounts, being £90m. In addition Thomson will be acquiring, in separate deals, Ferguson (Ireland) Ltd. and Thorn-EMI's one third interest in the joint VCR manufacturing venture J2T. In the year to end-March 1987 Ferguson made a loss of £12m, including rationalisation costs of £8m. Its net assets are valued at £81m.

As we go to press Thorn-EMI has announced a major acquisition in the USA. It is taking over the US Rent-A-Centre group for £371m in a bid that has the backing of the Rent-A-Centre board. Rent-A-Centre is one of the three leading consumer electronics rental companies in the USA with an estimated nine per cent of the market. In the last five years the firm's net profits have risen from

\$2.8m to \$9.9m – a further substantial increase is expected in the current year. In addition to consumer electronics goods, mainly TV sets and VCRs, Rent-A-Centre handles some furniture products.

For further information and comment on these moves see page 741.

### **DBS LATEST**

British Satellite Broadcasting (BSB), which has the UK DBS franchise, has been holding talks with semiconductor manufacturers with the aim of ensuring that chips to decode the MAC signals will be available for incorporation in receivers by the time the service starts in late 1989. BSB has gone as far as offering to help fund the development of chip sets. One problem that seems to be holding the semiconductor manufacturers back is the fact that the transmission standard has not been decided: while BSB and the UK government favour the D-MAC standard it's likely that the French and W. German DBS services will use D2-MAC. The Norwegian semiconductor design firm Nordic claims to have developed a dual-standard chip set capable of handling both D-MAC and D2-MAC. A consortium that calls itself Euro-MAC and includes Philips and Thomson is urging the adoption of a common standard for European DBS transmissions.

Plessey Semiconductors has announced a down-converter chip, type SP5062, for use in satellite TV head-end units. The circuitry makes use of Plessey's s.h.f. bipolar technology.

Meanwhile two consultancy organisations have issued reports that cast doubt on the prospects for BSB's DBS service, at any rate in the early years. Logica Consultancy's report suggests that only around 600,000 UK homes will be able to receive the service after the first five years. CIT Research's report suggests that BSB would have 150,000 subscribers after five years and 500,000 after ten years. BSB's business plan assumes the installation of some 350,000 receivers at the start of the service and five million receivers in use after five years. CIT's managing director Patrick Whitten points out that if cable TV is taken as a guide only ten per cent of consumers are prepared to pay extra for a premium service. At the moment of course all this is pure guesswork.

### **SUBSCRIPTION TV RECOMMENDED**

The report by CSP International, briefly mentioned last month, advocates the start of a subscription TV channel for UK viewers, using conventional terrestrial broadcasting. This report suggests that thirty per cent of households would be prepared to pay £10 a month for an additional, scrambled, premium channel. It says that plenty of spectrum space is available for such a service. If allocating further space to TV or finding ways of making greater use of the space already available proves to be unacceptable the report suggests curtailing the current services to slot in scrambled programming, or alternatively using periods when transmitters are at present off-air to download programmes. Such ideas are expected to be welcomed by those members of the government who favour a move to viewer payment for services provided.

### **CITIZEN'S POCKET COLOUR TV**

Citizen is shortly to launch in the UK a colour pocket portable TV set using an LC display. The set, Model TC53, is expected to be the only PAL-I standard LCD set available in the UK before Christmas. The NTSC version has been on sale in Japan and the USA for some time.

# Keith and Alex

**Les Lawry-Johns**

Keith and Alex have been up again from Pompey to straighten me out. They keep having to do it. If you recall, on the last occasion they were in the shop I'd sold a chap a tripler and told him to join the diode and earth leads together, whereupon Keith had commented "it won't last long like that". I wondered about this as I've always joined them for use in the ITT CVC32 chassis. Apparently the receiver had been a CVC5, not a CVC32 – the evidence being the tripler he'd had in his hand. Now I honestly didn't see a tripler of any type and understood that he wanted one for a CVC32. Hence the confusion. The chap never came back, so I assume that he must have read the leaflet and connected it correctly. My apologies, all round.

## **The Philips G11**

While Keith and Alex were paying their latest visit I told them about the Philips G11 that had me going for some time. In a nutshell, it blew the BU208A line output transistor every four days, despite fitting a nice new 470 $\mu$ F h.t. reservoir capacitor – on the first day. Three times it came back, and each time I went over the joints, resoldering every suspect and non-suspect. I could have fitted a new line scan panel but wasn't happy with this approach to the problem. When I'd fitted the last BU208A I kept the set on test for several days.

One morning I switched it on and it refused the start. The h.t. fuse was intact – it had always blown when the BU208A had gone short-circuit. The set started when the top plug supplying the BU208A was touched. My troubles were over when I connected an extra lead from the socket's base connector to the base of the transistor. The set's been going all day every day since but the owner hasn't been back to collect it. I suppose he was a bit fed up with it and with me.

The joke was when a gentleman came in to buy a black-and-white receiver since he's colour blind. Said he'd been everywhere (I doubt that) but hadn't been able to purchase one. He looked at the G11's picture – a black-and-white film happened to be on.

"I like that" he said.

I told him that one wasn't for sale, so he bought a 20in. Thorn 1500 which had had a new tube fitted. He told me that he could identify the balls on a snooker table without seeing the colours. Well I never . . .

## **The Bush T20**

Shortly after this a Bush T20 came in and a quick test proved that the BU208A was short-circuit. I fitted another one and resoldered all suspect joints. After switching on there was a lovely picture – for three minutes. Bonk. The BU208A had bit the dust. I did everything I could think of, including the addition of an earth lead from the timebase panel to the line scan panel, renewed the BU208A and the driver transistor and tried again. Two and a half minutes later the BU208A died. I put the set to one side and got on with some more rewarding jobs – not that there are many about nowadays.

I eventually tackled the T20 again. After fitting yet

another BU208A I concentrated on the joints that looked good and resoldered all that played a part in driving the line output stage. When I removed the solder from the legs of the line driver transformer I noticed that they weren't clean. I scraped them until they were shiny and resoldered them. This time the BU208A survived and so did I. Fooled by an old one like that!

## **Dr Dicey's Dynatron**

When Dr. Dicey phoned I knew I couldn't ask him to bring his set in – it's a great big 26in. Dynatron. So I would have to go to see him, and I didn't have a car. Mine had broken down on the way to Heathrow a few days earlier and as the cylinder head was now warped I would be without it for some time. I remembered my friend Les whose Dynatron I'd fixed a couple of days previously. He'd said he would like a new set but would like to have it fitted into the existing cabinet. I'd declined to do this on the grounds that it would be difficult to get one to fit. As Les is retired I got on the phone to him to see whether he would run me up to Dr. Dicey. He said it would be no trouble at all and he'd like to see Dr. Dicey again – he'd not seen him for some years.

"But he was a woman's doctor, one of those gynaecologist fellows" I said.

"Yes of course. I knew him outside his practice."

By now we were almost there and soon came to a halt in his drive. I went in and examined the patient, which had severe damage to the power supply and remote control receiver boards. The chassis is similar to that used in the Pye 731 series.

The doctor commented that had it been a woman he'd have sorted out its inside, but a TV set was another matter and he didn't feel inclined to have it repaired. He wanted to retain the cabinet and fit a new set inside it. I knew that this would mean two transplants, one for the doctor and one for Les. Oh well.

I carefully measured the inside of the cabinet and jotted down my findings. We returned to the shop to pick up a G11 in good working order to serve as a loan set while I ordered a new one. This kept him happy for a few days, and in the meantime I picked out the Pye 59KE2703 as the most suitable candidate for the operation. This arrived a few days later. It had a dark cabinet (anthracite) and a remote control handset. I quickly unpacked it and lined up the programmes.

The 24in. FST screen looked lovely and flat and I felt it would fit nicely into the doctor's cabinet, being 27in. wide and just over 18in. high. I contacted Les who was only too pleased to assist with the fitting, knowing that if all went well there'd be a repeat performance with his own set.

Up we steamed and I ripped out the panels and removed the tube. Then came the job of removing all the bits and pieces that would have impeded the entry of the new set. The Dynatron's nice looking front panel had to be removed, but shortly afterwards the new Pye looked out over the doctor's lounge and produced a good picture. All that was now necessary was to line up a programme for the doctor's video, which was quickly done.

I piled all the panels into a bin liner and struggled out with the tube, the G11, etc. while the doctor wrote out his cheque. On the way back Les said he wanted a set just like that and a video to go with it. When I ordered these the chap at the other end was interested to hear about our success in fitting the 24in. Pye into the Dynatron cabinet. Apparently he has one of them himself and wanted just this information . . .

# Caught Again

**Les Lawry-Johns**

First of all I'd like to thank John Wakely of Colliers Wood for his kind letter. It's nice to know that someone has long memories of the years gone by and has benefited from time to time from my jottings. I'm sorry if I'm not as bright as I used to be, but it's over thirty years since I started to write on TV servicing. I was in my thirties then, so we haven't done too badly – with a bit of luck and some help from the little angel who sits on my shoulder.

## **The ITT CVC30 Series**

Now a word of warning that concerns the ITT CVC32 chassis and its relatives. They keep coming in with the BU208 line output transistor short-circuit. You fit another one and everything is lovely – for a day or perhaps a week, then the nice new BU208 bites the dust for apparently no reason. When this first happened to me I went to bed and dreamed of a Bush T20. The next morning it dawned on me. If you have this sort of thing with a T20 you don't hesitate to look at the scan coil connection plug, and you are not surprised to find the end pin burnt. You wire the lead with solder and the battle is over. With the CVC32 etc. the orange lead, second from the bottom, requires the same treatment. Cut it at the plug and solder it to the panel. The rule is to look at this plug to see if any of the pins show signs of scorch marks and check the panel above the scan coils for dry-joints. I know that the ITT experts will be laughing at this "old one". But we can't all be ITT experts, and we can all be caught at some time or another.

## **Notes on GEC Sets**

If we get an old GEC C2110 series receiver – this includes the later C2219H etc. – that mucks about heightwise, varying with heat etc., we tend to charge the field driver transistor TR453 with being heat sensitive. This may well be so, but often the 47 $\mu$ F field charging capacitor C457 connected to its base is leaky, upsetting the AC128, BD150 or whatever is fitted in the TR453 position.

Now to something more up to date, the C1403H etc. These little sets are fitted with the ITT CVC1100 series chassis and we get a number in with the 1A chopper power supply fuse Si651 blown. The cause is usually the 120V over-voltage protection zener diode D658 (type ZPY120) going short-circuit. These little diodes seem to have a short life expectancy. Order some now.

## **Driven to Drink**

A Philips monochrome portable (TX chassis) nearly drove me barmy the other day. It had a very grainy picture that wouldn't respond to anything I did. I looked at it and it sneered.

"You think I don't know you need a new tuner, don't you?"

It didn't answer so I sucked off all the solder from the tuner's legs and selected a new U321 off the shelf. I looked at its legs (I always look at legs) to ensure that it hadn't seen service previously. They were bright and clean and had not seen solder. So I fitted it and switched on,

expecting to see a nice, clear picture. It was the same as before.

I checked the first i.f. stage and the a.g.c. circuit carefully. The latter wasn't working properly. It took me quite a long time before I found a leaky diode. This was replaced and I switched on again. Exactly the same results.

I put the portable to one side and got on with more fruitful activities, to wit a Philips K30 that arced viciously all over the tube base after switching on. I stared at it and then listened carefully. A spitting noise was coming from the line output transformer. Ah, ha! I just happened to have a spare transformer which was fitted in a trice. The spitting stopped and no damage had been done to anything else. At last a success. Now back to the portable.

I checked here, there and everywhere and got nowhere. At last I gave up, removed the new tuner and refitted the old one. Just for fun I gave it one last try. Perfect! The new tuner was faulty, the old one was o.k. and the set's trouble was the a.g.c. fault. What kind of fool am I?

## **The Ferguson TX9**

The next set in was a Ferguson Moviestar 14in. colour portable (TX9 chassis). It was brought along on a trolley to which the set was securely strapped. We unstrapped it and put it on the bench. "I dropped it" its owner – a lady we know well – said, "and when I put it on it went pop."

I took the chassis out and examined it. There were cracks in a dozen places but the tube was all right. Its owner keeps half a dozen dogs at any one time, so I thought I'd do my best for her. I asked her to call back in a couple of days' time.

It took me a fair amount of time to join up the tracks. I then closely examined the rest of the panel and checked for shorts – there weren't any. With the set still on its side I fitted a new 1.6A mains fuse and switched on. The set started up all right. The tube's heaters glowed and e.h.t. was present. I wrongly thought that the sound was muted because no aerial was connected, but at the time I was more interested in whether the fuse would hold. It did.

I put the set upright and the fuse immediately blew. I turned the chassis up and checked very carefully. No shorts. I put the set upright and checked the h.t. line etc. Many fuses and a mains filter capacitor later I found that with the chassis on its side a track became open-circuit, removing the 24V line output transformer derived supply to the TDA1170S field timebase chip. In short, the TDA1170S was short-circuit and the supply track to it was cracked. The crack was invisible to the naked eye (mine anyway). A meter check proved the point.

A length of wire was used to bypass the faulty track and a new TDA1170S was fitted. This time the fuse held and the screen lit up too brightly, with loud sound. The controls had no effect. This was traced to an open-circuit, which couldn't be seen, on the chassis socket.

Everything was fine until the chassis was put upright. With the set upright there was no sound and no picture. Only the tube heaters glowed. This time an open-circuit track to the 12V regulator was eventually found. It was again invisible and made with the chassis on its side. After this had been attended to everything in the garden was rosy and I regained a trace of my always shaky self-confidence.

When its owner came back with her trolley I was worried in case the set would get shaken up, probably opening more cracks. I asked whether I could run her home in the car, but she declined on the grounds that she

had only a few yards to go up the road. So I laid the set on the trolley carefully, resting it on a thick pad. She had a dozen straps with clips at either end and placed these carefully round the set – without attaching any of them to the trolley! I just had to speak when she came to the last two.

“Uh, the set’s completely covered with straps, none of which is attached to the trolley. What’s to stop it falling off?”

“Oh, I’ll hold it on.”

“What are the straps for then – to keep the set together?”

“You put the last two on then.”

So the set was secured to the trolley and its owner departed, bumping the trolley off the path into the road. Oh well . . .

## The Grundig

A Grundig 2210 with the two-thyristor line output stage was given to us by its owner. He didn’t say why he was parting with it. On examination the only fault seemed to be an open-circuit surge limiter resistor ( $12\Omega$ , 17W). There are two of these in series with the mains bridge

rectifier. We replaced the resistor, checked everything else and switched on. The tube had a lazy green gun but the picture was fair. I left the set on test.

The next day, a few minutes after switching on, it went bonk. This time the other surge limiter had failed. After replacing it I studied the circuit. There’s no fuse in the supply to the line output stage. I looked at the scan coil plug and decided to clip the h.t. loop and fit a 1A fuseholder. At least this would narrow down the fault possibilities. An hour later the fuse failed.

I changed both thyristors and their mica washers, fitted a new fuse and tried again. The set continued to work all day. Next day the fuse failed. This time I found a leaky diode in the beam limiter circuit, on the earthy side of the e.h.t. supply. I replaced it without much confidence. About an hour later the fuse again failed. By now I was getting fed up. I went over all the soldered joints, particularly those in the line output stage and the connections to the scan coils – remembering the ITT sets etc. All the contacts were found to be good. The set now rests, showing its magenta picture, and I’m expecting the fuse to fail at any moment. Why? Perhaps I’ll be able to tell you next month. Then again, perhaps I won’t.

# A Versatile Bench Transformer

Albert L. Hitchings

Often a particular transformer voltage is required and although you search through your Aladdin’s Cave of electrical goodies Murphy’s Law says ‘you won’t find one’. You need worry no more. All you need is an old transformer with a sound mains primary winding, or you can purchase a kit. RS Components sell suitable kits, cost depending on VA rating of course. They consist of a transformer with a primary already wound. You merely have to put on your own secondary and assemble the laminations etc. Instructions and technical information are supplied with the kit.

Let’s assume that you are going to use an old transformer however. First decide whether it will supply your power demands – it’s always a good idea to make one a little larger than your expected uses require. Check the transformer and measure some of the secondary voltages. Make a note of these, as you will be using this information to work out how many turns-per-volt will be required on the secondary you are going to wind. I suggest rewinding the secondary to provide a 40V output, obtained by connecting four separate windings in additive sequence. Make these secondary windings for 1V, 3V, 9V and 27V. This gives four windings, each one of which is three times the value of the previous one. As a result you can have any voltage you want between 1V and 40V in 1V steps.

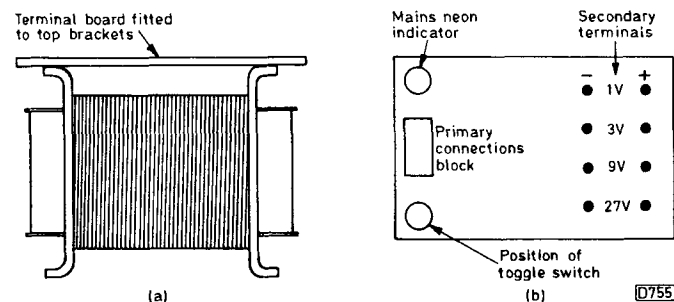


Fig. 1: Suitable transformer termination (a) and terminal/component layout (b).

Note that you should always check the transformer’s output voltage before you connect it to your circuit.

Fig. 1 shows at (a) a simple way of terminating the transformer to provide for the addition of a switch, a neon indicator light and a fuse – always a good feature in any electrical arrangement – and at (b) a suitable layout for the termination board. Fig. 2 shows at (a) the connections for two voltages available, 4V and 18V – the actual links are shown in (b). It may be thought strange to put positive and negative markings on an a.c. supply, but I find that this is a help in adding up or subtracting voltages.

Here are some more examples. 1V added to 9V gives 10V of course. 3V connected in opposition to 27V gives 24V. Should you require higher voltages, add a  $3 \times 27V$  winding, i.e. an 81V winding. You will now have available any voltage up to 121V in 1V steps.

Don’t forget to check voltages before making an external connection, and to earth the transformer, i.e. make sure that the iron laminations and frame are *effectively* earthed.

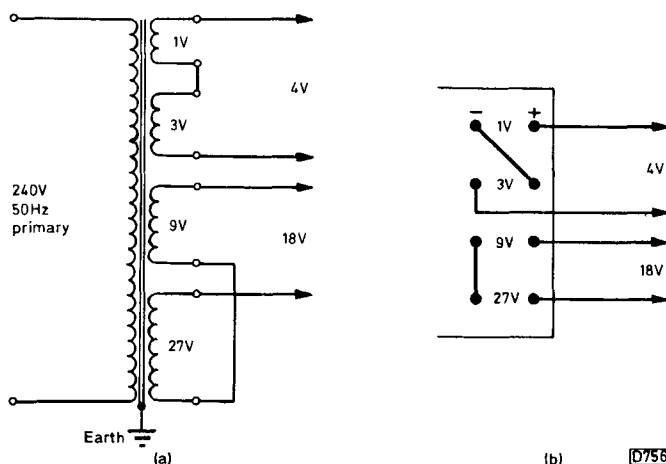


Fig. 2: Transformer windings, showing how to obtain 4V and 18V outputs (a). Links for 4V and 18V (b).

Despite this digression we must stress that a computer can be used and programmed by someone with no knowledge either of its workings or of binary arithmetic.

All the data that comprises a program is stored some-

where in the computer's memory, and must be put there to start with. Somehow the microprocessor must be told where it is and how to start fetching instructions. For this and other exiting revelations, stay tuned!

## *Fings aint what they used to be*

**Les Lawry-Johns**

I kid you not. Things are getting awkward. Some of the sets that come in now just don't want to be done and were apparently put together with this in mind. "Don't try to mend me" they seem to say, "buy another one". Even old favourites are getting stubborn. Or is it just me? (Chorus: "course it's you".)

### **Susan's Fidelity CTV14S**

Take for example Susan's Fidelity CTV14S – the Mk. II that is, with the ZX3000 chassis.

"It keeps changing channels on its own and will often switch itself off, though the handset is in the other room."

So I ruled out the handset and its battery. I checked here and there on the control panel, changed chips, but still the set would do it. Eventually I phoned Fidelity.

"The amplifier chip IC1 in the screened remote control receiver section could be producing spurious pulses. To check this, cut the track going to pin 2 of the ML923 decoder chip IC2 and wire a 10kΩ resistor from this pin to chassis. If the set no longer changes channels, change the chip in the receiver unit, then restore the link to IC2 and remove the 10kΩ resistor."

So I did the first bit and the set worked fine all day. I phoned Susan and her mother answered. "Is Susan keen on having the remote control handset?" I asked.

"Of course she is" replied her mother.

So I stripped down the receiver unit and replaced the chip, then restored the link between IC1 and IC2 and removed the 10kΩ resistor. The set continued to change channels and switch off without being told to.

Susan came in to find out about her set.

"It's fine without the remote control facility" I told her.

"I never use it anyway" said Susan.

In a flash the track was open-circuit again and the 10kΩ resistor was fitted. She carried the set off and later reported that the picture had never been so good. This made me scratch my head a bit. What had the handset to do with the picture? Never mind.

### **Another One**

Another of these sets has been causing me a real headache of late. It just won't start. When it was brought in the BU426A chopper transistor had gone short-circuit, the 2.2Ω surge limiter resistor R80 had burnt out and the d.c. fuse F2 had gone open-circuit. I fitted a BU508A in place of the BU426A and replaced the other items.

When I switched on all I got was a high d.c. voltage reading at the collector of the chopper transistor and at a couple of other points, but no controlled output from the chopper circuit. So I checked everything in sight and changed the TDA4600 chopper control chip. Still no joy. I now found that there was no start-up voltage at pin 9 of the chip due to an internal short. So I fitted another one. This gave me the start up voltage but nothing much else. I've tried a dozen times and Phil had a go all day on

Saturday, all to no useful end. I'll let you know what it turns out to be – the bloody transformer no doubt. No not the line output transformer. I've got plenty of those in stock and I'd opened the h.t. feed to the line output stage and still got no output from the chopper circuit. I mean the chopper transformer. I don't keep those in stock.

### **A Thorn 9000 Chassis**

Now everyone can repair a set fitted with the Thorn 9000 chassis, can't they? One came in the other day with the report that it failed after a couple of hours. I was a bit busy at the time and jumped at the thick-film over-voltage unit. A new one was fitted in no time. The set then sat there working for four hours. The owner came and collected it. Next day he brought it back again and told H.B. that it had failed after a couple of hours, adding that it came back on immediately.

Now he hadn't told us this the first time, i.e. that the set tripped at erratic intervals. I kept it on with the sound turned up slightly so that I could hear when it tripped. This it duly did. The sound went off and the picture collapsed to the centre for a brief moment before recovering and looking as good as it had done. This time I disconnected the tripler, and when this had been done the sound never faltered. A new tripler was fitted and the set gave no more trouble. Silly me!

### **A Word of Warning**

A couple of months ago I told you about us fitting a new 24in. Pye set in Dr. Dicey's Dynatron cabinet. I mentioned that it fitted well and looked out over his lounge. When I say "us", I mean me and Les who ran me up there. I also said that Les wanted a similar job done on his Dynatron.

So I ordered the same Pye model for Les. Unfortunately his cabinet housed a Pye hybrid colour chassis whereas the good Doctor's had housed a Pye 731 solid-state chassis. The upshot is that Les now keeps the cabinet in another part of the room (to house his booze, I think) while the Pye stands on its stand as it's supposed to do.

### **Transport**

I also mentioned that I was waiting to get my car back. I never did. I had to get another one. It's a gold (the colour!) Renault 18. Honey Bunch loves driving about in it and I suppose I'll get used to it in time. It's just that I don't find it easy nowadays to take to anything new or different. Which is why I find it difficult tackling these modern sets and trying to make sense of the circuit diagrams. I thought it was me but apparently there are a lot of others who find it hard to adapt to these new conditions, especially when they have a cat and two dogs to help them. Oh well, never mind, we've coped so far and I dare say we'll continue to do so.

switched off. The basic ROM, which retains its data, contains the operating system, BASIC interpreter and little else. The microprocessor distinguishes between the two by means of the addresses or an electronic switching arrangement – how it does this is irrelevant here.

### **Tapes and Disks**

Clearly if we need to keep any data other than that held in ROM we must keep it on tape or disc. For serious use a tape deck is inconveniently slow and prone to trouble. Files are stored on tape by modulating a signal with two frequencies used to denote one and zero respectively. Some business applications require multiple files: it's difficult to swap tapes to get at the files and to find where a required file is on a tape.

### **Disk Drive**

The answer to this is a disk drive. There are at least four disk standards in common use, and various operating systems for use with them. For smaller business machines the most common type of disk is the 5¼in. one, with an operating system known as DOS produced by Microsoft. This is designed to work with an 8088 or similar microprocessor. With home computers the situation is rather different. Many of these have no in-built disk drive, so this item must be purchased separately and may come with its own operating system. An exception to this is the Amstrad range that uses 3in. disks and an operating system known as CP/M – DOS was evolved from this and the two are similar in many respects.

With a disk-based machine the operating system looks after running the programs, the disk and other peripherals. The languages used are not usually contained in ROM but must be loaded from the disk, as indeed must the operating system itself. But hold it – how can we do this since we need an operating system to load a file from the disk?!

The answer is in ROM and is called a bootstrap program – the term “booting up” is derived from this. The bootstrap program starts a process which loads the operating system and prepares it to accept keyboard commands. How this works in detail will be explained after we've covered the way in which files are stored on disk.

### **Storing Data on Disks**

Unlike a tape, which is a serial device, a disk is divided into concentric areas called “tracks”. Each track is divided into “sectors”, and each sector can be found by its sector and track number. It must be stressed that the pattern is purely a magnetic one: it's laid down when a new disk is “formatted”, which must be done before it can be used. This is carried out by one of the operating system commands.

From here on for clarity we'll use DOS as the assumed operating system. The formatting process also reserves several sectors as a “directory” and some more as a “file allocation table” (FAT). The files on the disk have a directory entry which gives the file name, length and starting track/sector. The operating system puts the files on the disk contiguously. If a file increases or decreases in size, or is deleted altogether, DOS reallocates the space as necessary.

So how do we keep track of a file that may be spread all over the disk? The answer to this lies in the FAT. For convenience, the sectors are grouped in units called

“clusters”. Two sectors per cluster is typical. DOS recognises a cluster by a unique number, and a cluster is the smallest unit that can be allocated to a single file. The directory entry is actually the starting cluster number rather than a track and sector number. The FAT is divided into “cells”, each entry corresponding to one cluster on the disk in a fixed order. There are three possibilities for an entry: (1) The number of the next cluster in the file. (2) A unique code that means the cluster is unusable. (3) A unique code that means it's the last cluster of a file. Thus the DOS can pick up the first cluster number from the directory and use the FAT to trace the rest of the file. So unlike a tape any file on a disk can be reached without having to read other files first. And of course a disk system is much faster – after all it was designed for the job, not for reproducing audio!

Incidentally, when a file is erased nothing of the sort actually happens. What does happen is that the directory entry is changed so that the file name doesn't appear, and the FAT clusters are put on an “unused” list. This explains the apparent magic of programs which can recover an “erased” file – as long as the space hasn't been reused.

Next month a closer look at computer languages and reasons for choice.

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## **Still Hazy**

Yes, I have to admit that I'm still hazy and finding it very difficult to type this note. There are one or two things I must say however.

First, my thanks to Les Austin (see Letters page) for his help with the Grundig set that gave me so much trouble. You remember the 2210 that blows the 1A fuse I fitted in series with the supply to the line output stage? No, Les, it doesn't make any popping noises before it goes. It just goes. You did say that a lot of people cross over the e.h.t. tripler's diode and earth leads. This had happened to the set and on wiring it correctly I found out why. When wired correctly there was no luminance, only chroma. This was due to the 680Ω resistor R528 in the e.h.t. current sensing circuit having gone almost open-circuit, producing permanent beam limiting. Having put all this right the set is now working and I'm waiting to see whether the fuse still fails. Thanks for putting me on the right track.

Thanks also to the other kind chap who called in at the shop to give me a replacement for the small choke (L508) which is wired in series with the line scan thyristor's gate. He told me that when faulty it causes trouble due to the thyristor firing early. I fitted the choke but the fuse still blew. Thanks anyway.

Whoops – the fuse has gone again. Sorry Les: one day I'll find out what's doing it. Fancy the tripler being incorrectly connected and making so little difference.

Now what's all this about and why am I so hazy? Well, you see, at present the heart hasn't the heart to pump sufficient blood to my brain while I'm standing up or sitting down, only when I'm lying down, and I can't do that all day, can I? So I have to take some tablets, but only two per day as they are rather powerful. They work for about an hour, then I sink back into partial oblivion – still able to repair sets, but unable to remember much about them. So, as you can imagine, I'm getting myself into some fine old scraps.

**Les Lawry-Johns.**



ment used in the 3A chassis. Its effect is not to everyone's liking however — it's probably unnecessary with system I signals — and if it's used with a VCR that has full HQ circuitry you get a double dose of overshoot. So it's a handset option.

The on-screen display is stable in the absence of an off-air signal, unlike the usual ragged lettering when the background consists of snow. This is due to sync pulses being provided by the teletext sync generator when there's no signal input.

## Back in the Groove

**Les Lawry-Johns**

Yes, we're back in action. Well, nearly. At any rate it's better than living in a cloud all the time.

### The Fidelity ZX3000

Now what was it I promised to tell you in the December issue? Oh yes, it was about the Fidelity portable (ZX3000 chassis) that wouldn't start up. It was daft really, and quite simple. I'd been checking the tracks in the chopper circuit from below and had found them to be in order. After several days I checked again, this time from above, i.e. the component side. Two tracks were found to be open-circuit. Stupid, isn't it? And all that time wasted.

### Tripler Trouble

A Decca set fitted with the 80 series chassis led me a real dance. I wasn't thinking properly, but managed to discover that the tripler was faulty. Now I could see that it was a single-ended one, and instead of using a universal tripler and reading the instructions I thought I'd save time and fit a Philips G8 tripler. So I clipped off the leads and fitted it quite neatly into the space provided, noting that the e.h.t. lead wasn't quite long enough to reach when the chassis was lowered.

The result was a dark picture, and I found that there was little voltage at the tube's first anodes. A check around the first anode supply network revealed an open-circuit resistor. Time to look at the circuit diagram. It was one of the two resistors connected in series across the first anode potentiometer network. So they shouldn't have prevented the first anodes being supplied if they were faulty. In fact they were both faulty, so I disconnected them and tried again.

This time there was no picture at all. I called the set some nasty names and checked the voltages at the first anodes again. Now the readings were negative. So I hunted around for the first anode supply rectifier diode. There wasn't one, and it began to dawn on me that the new tripler wasn't the right one. This showed me what I didn't know about triplers. I thought that if they didn't have a negative diode lead they were all the same. The Philips tripler was removed, and I then selected a universal type and read the leaflet. Join the diode and earth leads together it said (as for the CVC32). With this fitted I had a nice clear picture and plenty of first anode voltage. I kicked myself for trying to be economic — and more than a little woozy.

### G11 on a Hazy Day

Yesterday afternoon I was getting really hazy. It was approaching closing time, so I didn't take another tablet (those tablets to strengthen the heart action and get blood up to the brain — cries of "why doesn't he stand on his head?"). A couple of chaps arrived with this enormous

Philips G11, still on its legs. They put it on the bench and I asked what I was supposed to do with it.

"There's no picture and no sound."

I thought I had an h.t. problem, but on switching the set on the tube's heaters lit up and the e.h.t. started hissing away like mad. Having cleared up the hissing I checked the loudspeaker and got a dead short reading, but on checking the audio output transistors I could hear the speaker responding. I checked the RGB output transistors and found that the base and emitter voltages were very low, with the collector voltages rather high. This explained the no picture condition. Why the loss of sound as well?

I made voltage checks and found lots of places where they were very low. I checked the line output panel but the voltages here were correct. By now my mind was completely bugged up. I had to express my regrets and wrap it up. The set was then carted off. After they'd gone I realised that the set was a remote control model, and that the fault must have been in the separate power unit which I hadn't checked. Silly me, but what do you do if you can't think?

The next day I found that the meter had a burnt out resistor in it. This explained the short-circuit reading I got when I checked the loudspeaker. With a new resistor fitted the meter read low-value resistances perfectly. If the owner of the set is reading this, as I suspect he might be, I do apologise. Just check that remote control power supply, will you? The one under the tube, left of centre.

### A Glance from Tessa

It was late in the evening. We decided to have a drink before retiring. I looked at the sherry bottle. It contained about three measures, so we decided to kill it off. After pouring one for myself and one for Honey Bunch I noticed Tess, who was sitting nearby, and was shocked by her appearance. She stared at me in a manner I'd not seen before. Not once did she blink or look away. She just stared. I knew what this meant. I'd to do something she wanted me to do. I drew H.B.'s attention to her.

"Oh, she wants your sherry."

"The drunken bitch."

"No she's not."

So I poured my sherry into a saucer for her. She immediately stopped staring and lapped it up — before I'd a chance to finish pouring out the remainder for myself. More staring. Why didn't she stare at H.B.? I knew I wasn't going to have that sherry and it's funny, when you know you're not going to have something, how you want it far more. I've never been particularly fond of sherry, but at that moment I really wanted that last drop.

I poured most of it into Tessa's saucer, then quickly knocked back the remainder. No more staring — but she did give a few hiccups before going to bed. She snored all night, leaving the guard duty to Zeb. Typical woman . . .

## CASE Structure

These control structures are mandatory for any computer language. There's another very useful one that's missing in BASIC. This is the CASE structure. Consider a program with a menu of choices from which the user has to choose a number or letter. With BASIC we would probably carry out an IF test on all the possible choices, or adopt some equally complicated method. The CASE structure eliminates this problem. Here's an example, in language C:

```
switch (choice)
{
    case 1: command; break;
    case 2: another command; break
    case 3: yet another; break
}
```

Much neater, isn't it? This particular section of code carries out different commands on the value of a variable

"choice". The word "break" is a part of language C to prevent execution of more than one command at this point.

## Threaded Interpretive Languages

Before closing this time we must mention another class of languages altogether. BASIC, C etc. are all procedural languages, i.e. the interpreter or compiler reads a list of instructions sequentially or in a sequence determined by a control structure. This other class of languages is called threaded interpretive – the best known example is FORTH. With these the language consists of a number of named routines known as words. You don't really write a program, but instead define new words in terms of existing ones, ending with a single word that executes the program. An application written in FORTH is really an extension of FORTH rather than something separate. We'll have more to say about FORTH next month, when we come to consider the suitability of these various languages for different applications.

# More Troubles

**Les Lawry-Johns**

Well here we are again, tapping all the wrong keys and making a mess of everything. How the editor puts up with it I just don't know. Poor old Stan from SEME is also on the rocks. He can't do much driving, so we have to phone our orders in and make sure he gets the credit. One way or another we all seem to be up against it. Perhaps we're being tested. Like I was when this chap brought in a fairly new 14in. Fidelity portable, a CTV140 I think.

## The Fidelity Portable

It didn't want to work at all, and I didn't suspect the line output transformer as I would have done with the earlier ZX2000 chassis. When I had switched it off however I checked between the line output stage feed resistor and chassis. The reading was 20Ω. Probably the BY127 efficiency diode in parallel with the line output transistor (BU508A). I peered inside and failed to see it. Someone had taken it out and fitted it underneath, as I discovered when I withdrew the panel. On closer inspection I found that it was fitted the wrong way round. So I removed it and checked again. The low reading was still present. I was about to bawl at the line output transformer when I thought I'd better check the transistor first. It was the BU508A that was causing the trouble, so I apologised to the transformer and fitted a nice new transistor and put the diode in the right way round.

When I switched the set on again I was rewarded with a nice, clear picture. On fitting the rear cover I saw a label attached. Rapid Repairs. Oh well, that explained it all. These Rapid Repairs people have been going around lately causing havoc. Not Rapid Repairs, actually, but you know who I mean – don't you?

## Before I Forget

Time to thank those of you who've written in to wish me a rapid recovery from the brain shut-down that's been troubling me of late. I'd like to thank in particular Ken Muir of Maidstone. He suggested that a book called "Service with a Smile", illustrated by Giles and containing

some of my articles, ought to be published. Articles other than the Red Baron one. What was wrong with the Red Baron? Thanks to E.V. Hurran for the tip about vitamin E. Must try this. In reply to David Botto of Bournemouth, thanks, I've stopped taking the tablets – they seemed to make my head spin round instead of being hazy. Also John Wakely of SW19 – sorry I took so long to acknowledge your letter.

## Mr. Cole's ITT

Mr. Cole came in moaning his head off about his old ITT CVC5 I'd repaired before Christmas.

"It's gone again. Now don't get me wrong, I'm not moaning, but it shouldn't have gone again so quickly, should it?"

"It depends on what's wrong with it."

"There's no sound. Here's the bill you gave me."

I looked at the bill. It said "replace the boost capacitor, 0.47μF 1kV, and test".

"That's got nothing to do with the sound" I said.

"Course it has. You did the set, didn't you? And it shouldn't have gone again so quickly."

So I told him to leave it with me to check over. I suspected the PCL86 audio valve but it turned out to be the loudspeaker. A new one put everything right and the sound was crisp and clear. I wrote on the bottom of the previous bill "fit new loudspeaker, previous one has given 15 years' service, £5".

When he came back he had a big smile on his face. I showed him his speaker and the bill and his smile faded.

"I'm not paying you any more money and that's that."

"O.k. Leave the set here and I'll sell it to get my money back."

"Not likely" he said as he tried to lift the set up. He couldn't, since I'd brought it in. "Help me get it to the car" he panted.

"Not likely" I said. "Pay your fiver or clear off."

So he paid his fiver and I picked up the set and put it in the car. If I'd known I'd have made it a tenner.

## Boozy Tessa

Tessa now has three saucers of sherry a night. Zeb won't drink but there's no doubt that Tessa's a drunkard. H.B. is on the wagon and says Tessa takes after her dad (you know who). All I have is a few scotches, only a few . . .

So, if you object to or cannot afford to pay for a TV licence your options are: (a) buy a playback only VCR and hire tapes; (b) live in a house that's more than fifty yards

from the road; (c) live in a high-rise block where almost everyone else has a licence; (d) construct a t.r.f. receiver (at u.h.f.!); (e) give up viewing!

# A Different Life

**Les Lawry-Johns**

I made this astounding discovery the other night. H.B. often claims to see things that I don't, and has often said that an old chap prowls around in the cellar where the living quarters were years ago. I dismissed this as imagination until our next door neighbour Irene told me that an old chap kept coming into their downstairs living quarters. She described him exactly as H.B. had done and told me she'd asked her husband Vic to put up a wooden screen to stop him coming through the wall that separates our shops. If a wall won't stop him, why should a fence? . . . H.B. also says she often sees an old girl in our lounge, constantly rocking to and fro in a rocking chair. I've not seen her either.

Last Sunday evening we were sitting looking at TV with the electric fire on. Tessa was sitting in front of it. She suddenly leapt to her feet and started to bark at the fire.

"She's daft" I said.

"No, she's barking at Trog" said H.B.

You may remember our black female cat Trog who was run over ten years ago – we now have Spock, who pokes her nose into everything.

"Trog's been dead for ten years" I pointed out.

"Yes but she was sitting by the fire until Tessa frightened her away."

I must say that I don't get this. Women and female dogs see things that we don't. Zeb didn't see anything either. I'm not stupid: it's just that females are different I suppose. I thought maybe it's my empty head, which has been funny for some time but is now improving thanks to the vitamin E Mr. Hurran recommended. It takes time though, and I'm still not working properly.

## The Philips K35

Take for example the 26in. Philips K35 that came in yesterday. For a while it nearly turned me barmy – when you tuned it in it would go slightly off tune and spoil the picture. When you tune it in you have to open the front flap, which disconnects the a.f.c., so I discounted a.f.c. trouble. I eventually found that the switch was faulty and realigned the a.f.c. coil cores (U157 and U158). The picture then tuned in correctly. Alignment isn't easy as the tuner is too near the a.f.c. coils.

At last we had all channels right and I was satisfied. Terry came to collect it and his wife phoned today to say that although TV reception was o.k. they couldn't get the set to accept the video channel. Oh dear, what a tangled web we weave.

## A Ferguson TX9

I was also driven up the wall by a TX9 – one of the ones with a thyristor power supply (PC1040 main panel). It had a good picture except for two well-spaced horizontal lines that revolved slowly. I bridged the electrolytics in the field

timebase chip's supply then fitted a new TDA1170 chip. The result of this was a constantly revolving picture, so I looked for the field hold preset. There isn't one. Of course, it should be a TDA1170S which works with close-tolerance components in the field oscillator department. With the correct chip fitted we were back to a good picture with slowly rotating horizontal white lines.

I then turned to the power supply and checked the electrolytics in this section of the set. They all proclaimed their innocence. At this point the test electrolytic came adrift and shorted to a point lower down. There was a flash and the 1-6AT mains fuse failed. I stuck in another which blew straight away at switch on. After much testing I found that the crowbar trip thyristor CSR2 was short-circuit. So I left this out while I continued to make tests.

The fuse now held and the picture, with the lines, returned as before. I found that the only way I could get rid of the lines was to shunt the power supply efficiency diode D77 with a 470 $\mu$ F, 250V electrolytic. This left slight dotted lines that were difficult to see. I was aware that I'd missed something, but for the life of me I couldn't find the real cause of the fault.

I fitted a new crowbar thyristor and wrapped the job up with the extra 470 $\mu$ F electrolytic securely fitted inside the cabinet. This made me feel guilty, but there haven't been any complaints.

## Another TX9

I'd just got rid of the TX9 when another one arrived, this time with a cracked panel that needed many leads fitted to restore normal working. This was done quite quickly. The owner collected it and was grateful to see the really good picture it displayed. It came back in a matter of hours with a very grainy picture.

"I'm not paying out any more on the thing" grunted the owner.

So I checked it over and came to the conclusion that the tuner was at fault. As the owner didn't want to pay for a new one I pulled off the side screen and the picture came up as good as new. It remained like this for some considerable time, then the owner came and carted the set away again.

It's a fact that removal of one side or the other will often restore normal reception and save replacement of the tuner – except in areas of high signal strength of course.

This left me a bit fed up with early TX9s. The TX10 seems to be a lot better – except for the focus control of course. Mind you they can be naughty at times, and I'll probably be eating these words within a week or two.

## The ITT CVC1120

Phil tells me that I must mention the ITT CVC1120 that came in last Saturday. My memory of this is very hazy and in fact I left it to Phil to tackle. The trouble was that the 1A fuse in the power supply kept blowing. Because the owner was an attractive young lady with large, er . . . eyes, Phil was eager to please her. To cut a long story short, he traced the trouble to the 10 $\mu$ F filter capacitor C701 which was short-circuit. Well done Phil. I won't tell Sara about the young lady with the . . . eyes.

That's all for now. See you next month.

the guide and introduce as small a mismatch as possible in doing so. Fig. 19 shows a common form of matched load. It consists of a short length of waveguide with one end closed off with an end plate: a wedge shaped piece of lossy material – usually resin loaded with iron dust – is slid into the guide. The principle is as follows. Microwave energy entering the wedge produces eddy currents within it, due to the iron content. These eddy currents dissipate the microwave energy in the form of heat. The wedge shape is used because the material introduces a discontinuity into the guide: to minimise reflections the discontinuity must be introduced gradually.

The length of the wedge should produce a reduction factor of 100, i.e. an attenuation of  $-20\text{dB}$ , as the energy passes through it. After passing through the wedge the attenuated energy is reflected by the end plate. It then passes back into the wedge where it will experience a further attenuation of  $-20\text{dB}$ . Thus the reflected signal emerging from the wedge should be  $1/10,000\text{th}$  ( $-40\text{dB}$ ) of the original level.

### Waveguide Attenuators

Attenuators are used to reduce the power level in a system. This may for example be necessary to protect a

delicate instrument when taking measurements where the transmitted power is relatively high.

Fig. 20 shows a common form of attenuator. Attenuation is produced by the tapered resistive strip which is inserted into the guide parallel with the narrow dimension. Microwave energy sets up currents in the strip (commonly referred to as a vane), the energy being dissipated as heat. The E field, which the vane obstructs, varies from zero at either sidewall to a maximum at the centre of the broad dimension. Maximum attenuation is thus obtained with the vane in the centre of the guide. The attenuation can be varied by adjusting the position of the vane.

The vane is tapered so that the disturbance it introduces in the guide is gradual, thereby keeping reflections from the vane to a minimum. The micrometer provides precise adjustment and enables the device to be calibrated in decibels accurately.

### Practical Devices

Note that the waveguide devices described in this article have been shown in the diagrams in their simplest form. In practice flanges would be included to allow connection between components and the main guide.

## Thanks a Million

**Les Lawry-Johns**

What a lovely lot of readers we do have. There's no doubt about it. For example Cliff Mitchell from Bexleyheath popped in last week and presented me with a bottle of Teacher's. A lovely man who remembered that H.B. doesn't like this brand in her coffee so that I'd have to drink the whole bottle neat. I toasted Cliff several times that evening. Cheers!

As he departed Keith and Alex from Portsmouth popped in. They were on their way to Sendz at Southend to pick up several bits and pieces and presented me with a couple of Thorn triplers. Thanks, lads, they'll come in very handy: I've had to ease up on my ordering recently so as not to upset my bank manager – since I've not been able to think too clearly of late I've not been able to make much money. Keith and Alex also sorted out the battery board of a Philips 10CX1120 that had been puzzling me. Although I had the circuit it didn't show what voltages to expect and I had been too stupid to expect a 110V output from the board. Thanks the pair of you – call in again and rescue me anytime!

### The Tandberg

This chap came in and asked me to look at his TV set. I asked him the make. Tandberg he said. I thought it would be of Scandinavian origin, but it had "Made in Scotland" on the back. I removed this and peered at the unfamiliar inside.

He said the picture was distorted. When I switched the set on there was hum on the sound and a severely curved picture, so I accused the main reservoir electrolytic of being open-circuit. I didn't have one with the right pins, so I checked the voltage and fitted a  $470\mu\text{F}$ , 300V electrolytic inside the cabinet, taped to the cableform that runs under the tube. The resulting picture was lovely and the sound

was clear of hum. I charged a tenner and he went away well pleased.

He came back next day and the new capacitor was a right old mess. I fitted another one and decided to leave the set on test for a while. After an hour I switched it off and left it for ten minutes. Upon switching on again there was a gurgling noise and the new capacitor had once again failed.

To cut a long story short, the switch-mode power supply was not switching on. Without a load the voltage produced by the mains bridge rectifier was excessive, so the reservoir capacitor failed. It transpired that the h.t. preset control was intermittently faulty. A new one, along with a new electrolytic (higher voltage this time, just in case) put things right. The set was tested for a further couple of days before the customer collected it and paid another five pounds.

### An ITT CVC9

A friend from the Medway towns brought in an ITT CVC9. He said he didn't have any valves for it so could I fix the set for him? The PY500 boost diode was getting very hot but the PL509 line output valve wasn't. I straight away checked the boost reservoir capacitor, but it was innocent. I checked the PY500 which was also innocent. So was the PL509. When I disconnected the tripler from the line output transformer the PY500 didn't overheat and the sound came on. I stared at the tripler: it shouldn't have caused the PY500 to overheat. Just then I noticed that the beam limiter resistor was cooked. There must have been a leak in the tripler.

Anyway, a new tripler and resistor restored normal operation and a beautiful picture was displayed. The set was a 22in. model. I've never had to replace the tube in one of these in my life. It's a pity that later models didn't have the same tube life span.

### More Tripler Trouble

How about that Grundig 2210 that had me by the short and curlies (remember? – last November!). It kept blowing the fuse I'd added in the supply to the line output stage, sometimes after an hour or so, sometimes after a whole

day. The cause of the trouble turned out to be the new tripler that had been fitted a short time earlier.

How did we find out? Well, you'll remember that the set had been given to us. Phil took it home with him and his parents' Grundig needed a new tripler. So he fitted the one

from the 2210. It worked fine for a while, then the cut-out started to trip every now and again. Oh well, as long as we know. Thanks Les Austin (Letters, January) for all your advice on these sets. Sorry it took so long. Some of those resistors had been the wrong value.

# Resurrecting a Dead Siemens

Colin Boggis

I was recently given a 22in. Siemens Model FF306 with remote control. The problem was that the thick-film focus and first anode supply unit had flashed over, rendering the entire line output transformer, of which it's a part, useless. The spares agent for these sets is Mastercare, and an enquiry produced the information that replacement line output transformers cost around £60. This explains why I was given the set – with labour, the repair bill would have been around £100. That's a bit steep for a four year old set, even allowing for the fact that it was otherwise in almost new condition.

I decided to see whether it would be possible to resurrect the set for a lot less money. The line output stage circuitry (see Fig. 1) is standard, so I thought that it might be possible to use a Ferguson TX10 focus assembly along with a separate potentiometer for the first anode supply – provided the faulty parts could be safely isolated from the existing line output transformer.

## Modifications

Adopting a "go for broke" approach, I simply cut off the top part of the focus assembly (see Fig. 2), using a hacksaw as carefully as I could manage. Having done this I covered the exposed wire ends with epoxy glue to provide insulation.

I then wired in the TX10 focus unit and a first anode potentiometer (see circuit shown in Fig. 3) and crossed my fingers as I switched the set on. It sprang into life, with a healthy crackle as the e.h.t. came up, and after setting the first anode voltage, the grey-scale and focus I was rewarded with a perfect picture.

To check the safety of the epoxy resin insulation I gingerly prodded around the glue with an earthed probe, trying to provoke a response. None came, so I appeared to

have won. The modification cost about £10, a saving on parts of some £50.

After soak testing for a week or so the set developed a "flutter" when switched on from cold. This was traced to a faulty BR303 thyristor in the power control circuitry.

It's six months since I sold the set and there's been no comeback. A lot of TV sets use a similar line output transformer assembly and in suitable cases this TX10 approach might well be worth trying.

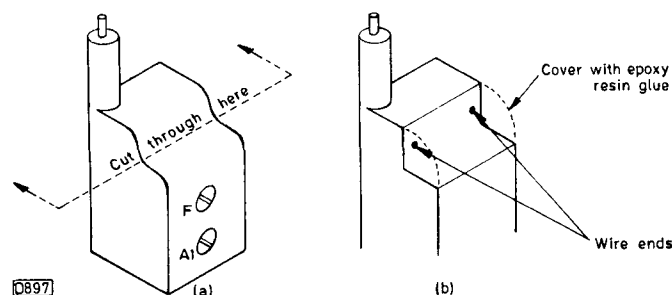


Fig. 2: Where to cut through the focus/A1 section of the line output transformer (a), application of epoxy resin insulation (b).

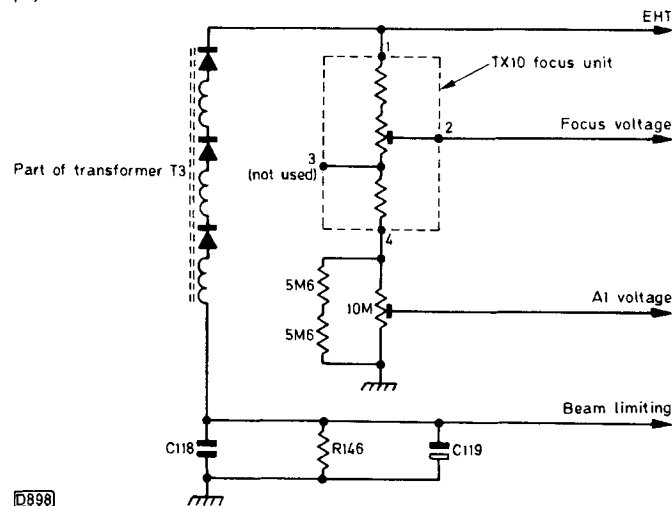


Fig. 3: Modified circuit using the focus unit used in the Ferguson TX10 chassis.

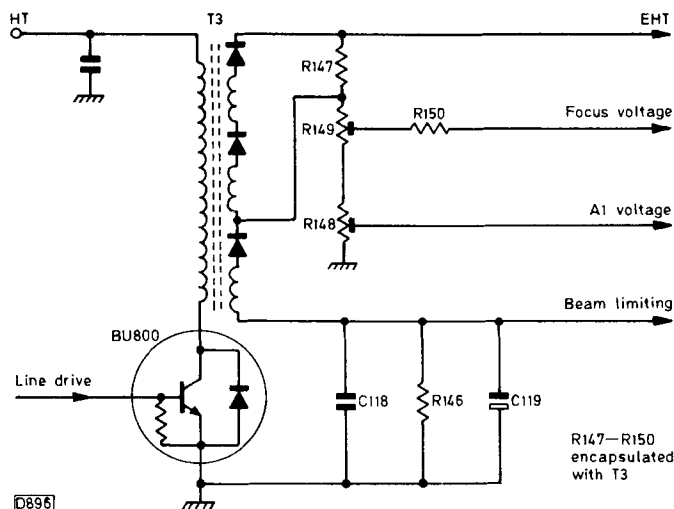


Fig. 1: Original e.h.t., focus and first anode supply circuitry used in the Siemens Model FF306.

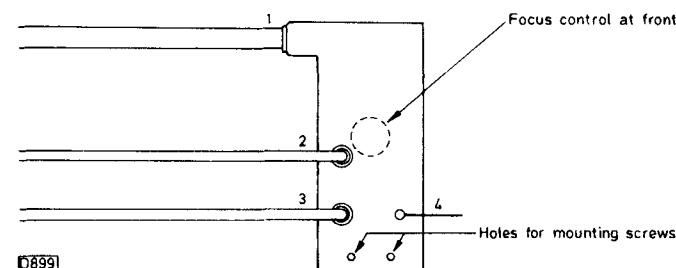


Fig. 4: Connections to the TX10 focus module (rear view).

# What's up Doc?

**Les Lawry-Johns**

You may remember the articles "What's up Doc?" parts one and two that I wrote some while back. They related to an examination (painful) I had to have and a prostate operation to help remove a swelling on my right-hand side. I still have the swelling, but at least I know that it's nothing to worry about. What has been worrying me is this heart trouble I've mentioned from time to time recently. My doctor made an appointment for me to see a heart specialist about my muzzy head, which doesn't allow me to think straight – or to write straight either.

It took some time for the date of my appointment to come round. I went along to the hospital on March 30th and after a while I was weighed and measured. Then I went in to see the specialist. He asked me what the trouble was and I told him I couldn't think straight because my doctor thought my heart wouldn't pump enough blood up to my brain.

"How long has this been going on?" he asked.

"Since last October" I replied. "I seem to be muzzy most of the time."

So he asked me some questions to see whether my brain was working.

"Who's after Neil Kinnock's job?"

"Tony Benn."

"Who's helping him?"

"Some left-winger. I forget the name."

"How many children has the Queen got?"

"Four, I think."

"Name them."

"There's Charles and Ann and the one in the Fleet Air Arm, my old mob, that's Andrew. And one who wants to be on the stage, er, I forget his name."

"Edward."

That's all he asked. I think. Then he gave me a brief check over and some chits of paper to go and have tests. As I made my way down the corridor I kept seeing people I knew I should have known, but I couldn't think of their names. One of them told me to pop into the X-ray room first and give them my name and one of the chits, then to go to the blood test department to get that over with, after which I'd be first in line for the X-rays. It nearly worked out like that.

I told them in the blood department that they'd find it was largely whisky, and that raised a laugh. But I think I'll get a ticking off from the specialist when I see him again. It's just that I don't like the idea of swallowing a lot of rat poison to keep my blood thin. Well, that's my story anyway.

The girl in the X-ray room told me to undress, upper part only. After the X-rays I dressed and was then called back and told to get undressed again as the machine hadn't seen enough.

The tablets I was given to take are very small white ones. It says on the bottle take half a tablet twice a day. The job is cutting each one in two. Oh well, all in the cause of science I suppose. Back to work.

This Skantic set had a Luxor chassis inside and I spent quite a long time trying to find out why it wouldn't start. Eventually I gave up. When its owner came back I explained that I wasn't thinking too clearly and couldn't do

it. I put it on the bench to show him. Switched it on and a beautiful picture appeared, with good sound. I told him to take it away as I wasn't feeling up to it all.

But if there's one set that doesn't worry me it's a G11. Until this one came along. I'd resoldered all the joints, fitted a new line output transistor, and had the set on test. After a while the picture faded. The sound faded too. Attention to the video panel restored a good picture, but the sound remained low. As it was a remote control version I first tested the audio section on the lower left side – this responded well to tests – then turned my attention to the extreme left side remote control panel. After a lot of seeking I replaced the resistor that feeds the volume control. This restored normal sound, and the set was collected shortly afterwards. It came back next day with the complaint "no sound". I switched it on and received full sound. Oh well . . .

## **Philips KT3 Drill**

Some of our usual stock faults are changing slightly, though they still come in often enough. Take the Philips KT3 chassis. It was common for the tripler to cause audible tripping. We now more often get complete shut down. If the h.t. is present at both ends of the 4.7Ω surge limiting resistor in the power supply, don't waste time – disconnect the line output transistor (remove the connecting screws to its collector). If this restores some signs of life, disconnect the tripler's input lead and replace the line output transistor. If the line output stage now works, bring the tripler's disconnected lead back near to it (beware of the high voltage). If the result is tripping, replace the tripler and write out the bill.

Remember the drill. If the set is tripping, disconnect the tripler. If this was the cause of the fault the tripping will stop and the tube's heaters will light up. If the set is dead, check the 4.7Ω resistor on the power board then, if necessary, disconnect the line output transistor (I didn't say the BU208A, because alternatives are sometimes fitted). It's also wise to disconnect the tripler to prevent the new transistor going up the creek. It may not do so, but it's sensible to protect it in this way.

## **Is This a Record?**

Something that I might claim to put in the book of records has just happened. A car drew up outside and the driver left its engine running as he carried in an old Decca Bradford. He left the door open as well.

"I'd like you to look at this and tell me how much it would cost to repair it."

"If you'd like to leave it, I'll look it over and tell you this afternoon."

"Could you look at it now?"

So I looked, having removed the rear cover. I switched it on and the tube's heaters glowed but the valves didn't light up. I thought I'd start at the beginning, so I switched off and removed the PY500 boost diode, whose heater comes first in the heater chain. The top cap came off and there was a hole in the glass. A check on the heater confirmed that it was open-circuit.

I fitted a new PY500 and switched on again, keeping my eyes on the heaters, ready to switch off in a hurry. The heaters all glowed but there was no sign of life at the PY500's top cap. So I turned the set on its side and carefully slid the chassis out. The 500mA fuse in the supply to the PY500 was open-circuit. I fitted another and turned the set upright. When the set had been switched on again and the valves had warmed up, life returned to the line

output stage. Connecting an aerial produced a picture. The tube was in good order and the sound was clear.

"How much?" he asked.

"Twelve quid" I replied.

"O.k., I'll have it done."

"It is done."

"Make out the bill then."

So I made him out a bill. He paid up and carted the set out – after I'd replaced the rear cover. He put it back in the car, closed the door (at last), jumped in the driver's side and drove off.

I ask you. Draw up, leave the engine running, leave the door open and have the set repaired before closing the door again. Can I claim a record – for being a fool?

# Practical Computer Programming

## Part 5

Mike Phelan

It's time we considered the steps involved in designing, producing and testing a typical computer application. As an example we've selected a repair history database covering customers' equipment. We want to be able to store data on the types of faults dealt with, actual repairs carried out, parts fitted, charges made and so on.

Before deciding to go ahead it's worth considering whether the use of a computer to do the job is appropriate. If the use of a computer entails extra cost, time spent or any other debit aspect, it may be better to do the job manually. If, on the other hand, a computer is available, the volume of work is such that keeping paper records is not really feasible, or you wish to be able to extract much more information than could readily be done with a manual paper system, then the use of a computer is worth consideration. A direct comparison is usually difficult, because the computer system will end up giving you more than the manual one it might replace. Another point, though an obvious one, is that the amount of detail required in any output, whether on a screen or a print-out, must at some stage be keyed in.

This raises the question the amount of data to be held. A database system reads the information from tape or disk and holds some or all of it in memory. Is there enough room for this? Maybe we shall have to sacrifice some of the data – or not store it for ten years! Generally it's not necessary to keep data for too long, but in the present example it would be nice to record the history of a set during its lifetime – whatever that may be.

## System Specification

Assuming we've decided that a computer system is appropriate, we can go ahead with its design. You may be surprised that we've not so far mentioned anything about the choice between an off-the-shelf package or dedicated software, and in the latter case which computer language to use. We will not be going into this for some time yet. At this stage, the truth is that it doesn't matter. These questions will be taken up at the end of the design stage.

In this context, design is what is called a "system specification" as opposed to a program specification. The system specification covers things like which items of data are to be stored, how the system must appear to the user and what comes out of it in what format. After doing this we can decide on which package or language to use, taking into account the budget, expertise available and the possible limitations of a particular language.

Now down to it. We start at the back end. What do we want out of the system? Fairly typical things on the list would be: (1) a complete service history of any set; (2) turnover in a given period; (3) the progress of a particular job (in a large or medium business); (4) parts used; (5) call rates per annum for a given make/model. Items (1)

and (3) could be available on-screen only, items (2) and (5) printed, while (4) might need to be interfaced with some form of stock control should the system be expanded. In our example, we'll leave out (4).

## Design Procedure

The next stage is to design on paper the five types of report required, detailing each item of data and whether it is to be entered directly or calculated from other data. Following this we list all the data items that need to be stored on disk, excluding those that can be calculated on the spot (call rate percentages and so on). We also need to specify the type of data (numerical or character) and its width, i.e. how many digits per item.

A first attempt might look like this:

1	Name	16
2	Address line 1	24
3	Address line 2	24
4	Address line 3	24
5	Address line 4	24
6	Postcode	9
7	Telephone number	12
8	Make	10
9	Model	10
10	Repair description	50
11	Net cost	10
12	Price charged	10

which amounts to a space requirement of 223 digits (bytes) per record. We now have a database consisting of one record per repair job, which is the level of detail we need. The record has twelve "fields".

Suppose that we have 200 customers, each with a rather troublesome video, TV set and radio receiver, and that each of these items generates five service calls a year. Over a complete year we would have  $200 \times 3 \times 5$  records of 223 bytes each, which would take up 653K bytes of disk space! As this is beyond the limits of most disk systems in our range, we must clearly cut down somewhere.

It will help if we can reduce the size of some of the fields in each record. Each item needs only sufficient information to make it unique. This is an important point. For example, we don't actually need 9 digits for the postcode since it's not necessary to store the space between the two parts, so 8 will do. Likewise a phone number requires only 10 digits, or we might decide to omit this item – there's an excellent database called the telephone directory. We will normally need to phone the customer only while a repair is in progress. The job will have some sort of ticket attached to it, and we can write the phone number on this when given. Other savings can be made on things like the make and model – using the



that it wasn't packed in the usual polystyrene mouldings but in expanded foam. There were also the remains of two permalloy assemblies. When we fitted the tube we found that it was difficult to set up. With the purity set correctly convergence was impossible. I noticed that it would set up better if the degaussing coils were disconnected. Current was obviously flowing through the coils — with the coils out of circuit a scope showed 80V peak-to-peak pulses at line rate. Not having a set with which to make comparisons, we rang Sony technical (SES) to find out whether or not this was normal. They couldn't advise on this. Nor could they say whether it's normal to have blue and green shading from the corners rather than the sides during purity adjustment, something we've not had before. After one or two more fruitless questions we were advised to stick on as many disc magnets as might be required to mask any defects, as that's what they do. Does this

illustrate Mr. McCormick's point?

We haven't had the best of service from SES. On the very rare occasions when we seek information it's usually a case of "too old, before our time" or "too new, no faults known". Panasonic on the other hand have been known to telex Japan for obscure information on industrial products. They can provide voltages and waveforms that are not on our service sheets, and will always ring back if necessary.

Sony's policy on service manuals is another strange one. Only top dealers get automatic mail shots whereas all their dealers used to get these. The administrative work of having to send individual manuals invoiced f.o.c. and the phone calls must surely cost more than sending ten or twelve together for each dealer on the lorry.

Nick Beer,  
Bideford, N. Devon.

## Outlook Cloudy

Les Lawry-Johns

A customer brought in an ITT set fitted with the CVC30 chassis and full remote control. He complained of no sound or picture, and remarked vaguely about random channel changing after the set had warmed up. I studied the chassis and decided to replace the left-side i.f. panel. Doing this made no difference at all, so I looked at the circuit diagram and saw that I'd marked R28 (820Ω) with a star. The trouble was that I couldn't find it.

At this point a young friend of mine by the name of Surinder Lakha came in to ask me something. He looked at the set on the bench and asked what was wrong. I told him — basically no sound or vision with the timebases working. "I've had that trouble" he said. "It's the resistor down the bottom." He pointed to the lower left side. I looked there and found R28 looking back at me. Quick as a flash it was out and was replaced with two resistors, of 300Ω and 520Ω, in series. I thought they would last longer. The picture and sound then came on and stayed. Thanks a lot Surinder — call in again any time!

If I'd marked it with a star, how come I didn't know where it lived? The clouds are still a bit thick. The set's owner came and collected it. Next day he was back again to tell me I needed sorting out and that he was just the one to do it. I hadn't dealt with his tuning troubles you see. I had a word with Geoff (Moon Lane) about the problem and he referred me to his friend in Welling, an ITT expert. The advice I was given was to replace the SAA1124 chip in the remote control unit. I did this when the set was brought back. It went off again and I've heard no more — I'm still waiting to have my head bashed in . . .

### More Confusion

Just to show you how daft I am, the other day I collected a T20 which suffered from intermittently poor focus. I fitted three focus units before I realised that it was a T20 and that the tube base socket was therefore at fault. I keep these in stock and one was fitted in no time, giving perfect focus that didn't vary.

How loony can I get? Now the psoriasis is coming back, affecting my hands, nose and ears. Once I become the Ugly Man my mind should clear despite what the medical profession tell me. I went back to the specialist the other

day. He told me to go back to my doctor and continue with the pills. He hadn't been able to find much wrong with me. Perhaps I'm just going barmy — or getting old.

### The Ferguson TX9

A colour portable fitted with the Ferguson TX9 chassis came in yesterday and had me by the short and curlies for a little while. Field collapse usually means that the TDA1170S field timebase chip has failed. This time however the field scan was about two inches high, which gave me a moment's hesitation. Having checked the supply I changed the TDA1170S, but I needn't have bothered as the results were just the same. I next checked the height control and found that there was no voltage here at all. R268 (1.5MΩ) which is in series with it was open-circuit. The old adage still holds good: check that the voltages are right before you do anything else.

### The Philips G9

A 26in. Roberts set fitted with the Philips G9 chassis came in the other day, with several troubles. They all seemed to clear when I replaced the lower right side timebase panel. Off it went and back it came next day, for field collapse after the set had been on for a time. This surprised me as I'd replaced the timebase panel. The cause of the trouble turned out to be a poor contact at the top of the left side convergence panel — a run round with the soldering iron cleared it permanently. But it had still needed the timebase panel.

### Hey What's This?

What's this I hear? Someone was looking through a 1957 issue of *Practical Television*, as we then were, and came across my article of the Etronic Models ECV1523 and ECV1527. He asks whether the Les Lawry-Johns of today is the L. Lawry-Johns of those days and suggests it's maybe a pen name that several people have used. Not so! I wrote about those sets then just the same as I'm writing this now — well, nearly the same. It seems that the reader who enquired is about to retire. That doesn't mean I've got to, though it might not seem a bad idea. I must give it some thought.

July is a month of birthdays. Surinder, whom I mentioned earlier, has his on the first while Honey Bunch's is on the fourth. Independence Day, yes indeed. Happy birthday love.

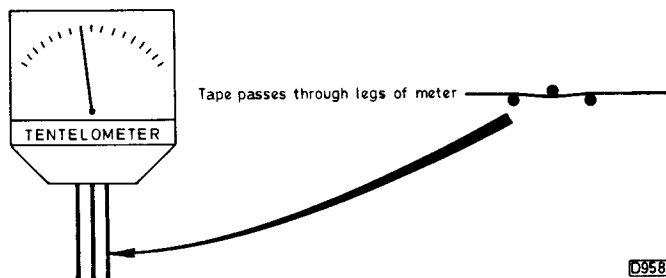


Fig. 2: The Panasonic Tentelometer and its use.

I hope I've said enough to stress the importance of back tension, and that you'll accordingly check this point. The price of a meter or a cassette meter will soon be recouped, especially if you care for a number of rental machines.

## The Blaze

Les Lawry-Johns

A red Consul drew up outside. Its driver came in to collect his set which, on investigation, had turned out to be not worth repairing. He carried the set out, put it in the car, closed the boot and got in behind the driving wheel. His wife and two children were with him. I heard him trying to start the car, but it didn't want to know. Next thing I knew they were all coming into the shop. "Call the fire brigade, my car's on fire!"

So I dialled 999. When I got through to the fire people I told them there was a car on fire outside my shop and they promised to be there in a moment. As I turned from the phone I saw Phil, who comes in on Saturdays, struggling with the shop fire extinguisher. I took it from him, whipped out the wire and went out to the car. Flames were coming from under the bonnet. So I bashed the top of the extinguisher and directed the spout up near a front wheel. The extinguisher gushed out a white cloud, and at that moment the car's starter started up. After a few more moments the white cloud stopped gushing and the flames were out – there was still a lot of smoke, but the fire was dying down. H.B. shouted at me to get away from the car – she was leaning out of an upstairs window and thought it was about to blow up. It wasn't.

Just then the fire brigade arrived, along with a police car. The firemen lifted the car's bonnet and looked at the mess inside. It was a mess. I recognised the policeman as he got out of his car. It was Bill Bevan, whose wife is expecting. He took the car driver's name and address, and the number of the car. He suggested that when I got the bill for refuelling the extinguisher I should send it to the car's owner who would present it to his insurance company. When I got the estimate it was for eighty pounds plus VAT. I wrote to the address Bill gave me, but haven't had a reply. Oh well! And what did the local rag say next week? "Fire brigade puts out car fire." Thanks a million!

### The Fidelity ZX2000 Chassis

I've serviced hundreds of Fidelity TV sets. In the earlier ZX2000 chassis failure of the line output transformer is the usual cause of R901 in the supply to the line output stage being burnt out. Normally you replace the transformer with the later type from the ZX3000 chassis, fitting the adaptor base, remove the focus and first anode controls as these are built into the new transformer, replace the resistor and

everything works fine.

The last one I did this to came back a few days later. This time I found that the chopper transistor and the chopper circuit efficiency diode D24 (RGP15J) had failed. I must confess that the diagnosis and repair were not as straightforward as this account suggests – my muddled head is going to get me into some trouble soon.

### How's This for Service?

Phil dropped in during the week to see if I had an SN76532N for an ITT VC300 monochrome portable he was repairing. I looked here, there and everywhere but couldn't find one. He left and enquired around the town but didn't have any luck. Someone told him that Gosling Electronics would have one, but they are in south London, some twenty miles away.

Not to be deterred, Phil jumped into his car and sped off there – after checking by phone to ensure that they had one. He found the shop, but the chip was in the outside engineer's van. Gosling drew a diagram to show where his calls were and Phil once more set off on the chase. First here, then there and eventually, would you believe it, Phil caught up with him. The engineer had the chip and let Phil have it (too cheaply I thought). When Phil got back and fitted the SN76532N sync was restored. You think you go to a lot of trouble to please your customers!

### Two Old Dears

These old dears brought their white Ferguson 3848 (1690 chassis) along in a black dustbin bag. As I got it out they told me there was no sound or vision. While they nattered away I whiped the back off, releasing the aerial etc. panel for easier access. When I switched the set on there was slight sound and the tube's heater was dim. On removing the e.h.t. cap the set showed more life.

I switched the set off and clipped the e.h.t. lead. The right sort of e.h.t. diode wasn't in stock – the only one I could find was the little white Thorn 8000 chassis type. I screwed this on to the line output transformer's screen, then connected the line output transformer to it – after removing the new unit's stud and carefully insulating the connection. When the e.h.t. cap was connected to the tube the set sprang to life, with a good picture and full sound. I know I should have replaced the complete overwinding, but it wasn't necessary. Meanwhile the ladies were still nattering away as I replaced the cabinet etc. I heard one of them say "makes you wonder what it's all for".

"Don't you know?" I asked.

"No I don't" one of them replied.

So I explained to them what life is all about.

"When you're young you get a partner, then a child whom you bring up as best you can. When it has repeated the process it's time for you to go to make room for the newcomer. That's all there is to it, whether you like it or not. No point in belly aching about it."

They looked at me as though I was mad.

"I don't think much of that view of life – when will the set be ready?"

"It's ready right now and the charge is ten quid."

They paid up and departed, still thinking they were important, as we tend to do. When will we learn? From the red salmon for example, which dies after spawning. But why do some spirits survive – like the soldiers under the local fort. They keep on appearing, though their boss General Gordon never does. . .

# Haunted

**Les Lawry-Johns**

I seem to be haunted by Fidelity colour portables of late. If not of the ZX2000 series, then the later ZX3000 version. One that stopped me in my tracks for a while came in the other day. It was a CTV14S, fitted with the ZX3000 chassis. Its trouble was no green. Checks on the tube base panel revealed that the voltages in the green output stage were way out. It took some time to find that the 100k $\Omega$  bias resistor R214 was open-circuit. Fitting a replacement restored the green and my flagging spirits. The equivalent resistors in the red and blue channels are R224 and R204 respectively. So the moral is, if one colour goes check the relevant bias resistor on the tube base panel before you consider changing the TDA3562A colour decoder chip with its 28 pins.

The Philips KT3 chassis is also getting to be all too predictable. Quite apart from the 4.7 $\Omega$  surge limiting resistor on the power supply panel and the tripler, which sometimes kills the line output transistor, it's now common to find that the tube is faulty. Sometimes you find that for some while only one colour appears, the other two finally coming on after a struggle. In this event I usually short out one of the heater chokes on the tube base to liven up the heaters so that the lazy colours are not so long in coming through. This seems to satisfy most people. But not Mrs. Grouser.

"I want the proper picture when I switch on. I don't see why you can't do it."

"I can for about eighty pounds Mrs. Grouser."

"What? I'm not paying that sort of money on this old set."

"Well you'll have to get a new one then."

"I will too. Snippers down the road have some nice ones. Quite cheap too."

"O.K. Mrs. Grouser. Just see if they're prepared to repair it if anything goes wrong."

So out she went, hoping to get something for nothing as they all do. Or nearly all.

## Pete's 9600

Shortly afterwards this chap struggled in with an Ultra set fitted with the Thorn 9600 chassis. I vaguely recognised him but couldn't put a name to him. H.B. came into the shop from the kitchen. "Hullo Pete" she said. "Hullo love" said Pete.

I whipped the back off. The 2.5A mains fuse on the left-hand side had blown and a meter check showed that the chopper transistor on the right-hand side was short-circuit. I also noticed that the brown lead to plug 511 on the chopper power supply panel had been disconnected from the plug and soldered directly to the panel. "Some rough work has been done on this set" I commented.

Pete looked at me but didn't say anything.

"Pick it up later on?" I asked.

So he left, saying he'd be back before we closed.

When he'd gone H.B. asked me why I didn't recognise him as we'd sold him the set some years ago and had always looked after it. This meant that I'd done the rough work. Oh dear.

Still in a muddle, I prepared to replace the chopper transistor, stupidly unsoldering the base and emitter contacts, one of which broke off. When I removed the two

screws that hold the transistor I was able to pull it out of its holder. So in fact I'd messed up the holder. This took some time to repair, but at last it was done and a new chopper transistor was fitted. I checked the circuit carefully but couldn't find anything else amiss. So I plugged the thing in and switched on. There was a flash from the right-hand side panel and the new transistor was dead. What had killed it? Closer examination showed that plug 511 had a poor neutral lead connection in addition to the previously attended to live lead connection. So the plug came out altogether and the neutral lead was soldered to the panel as the live one had been. If I'd done this years ago when the live lead gave trouble I wouldn't have had to fit another chopper transistor. Very rough work indeed, and all my own fault. Sorry, very sorry.

## Another Blunder

A few years ago I sold a Philips CTX-E colour portable to a lady who phoned the other day to say that it had gone wrong. I nipped over and picked it up, not having time to do it on the spot. Back in the shop I plugged the set in and switched it on. Nothing happened. So I slid the chassis out and found that there was a full 300V at the chopper transistor's collector and nothing at its emitter. I searched everywhere and after an hour or so I gave up.

Later on I had another go and this time I looked at the front. The standby light was on. When I pressed the selector button I heard the set start up. All that mucking about over nothing. How stupid can I get? With an aerial connected the sound boomed out but there was nothing on the screen. A bell rang in the back of my mind. When I turned up the first anode control there was a white line across the screen. So I checked the voltages around the TDA3651 field output chip. The supply was present but there were no other voltages. I unsoldered the pins and removed it on its heatsink. It was marked TDA3653. Oh well. As I couldn't find one of these I ended up fitting a TDA3652, which worked just as well. I now had a very bright picture, so I had to turn the first anode control down again. Ten minutes later the set's owner turned up to collect it. She'd got her boss to run her up. What next?

## The Next Disaster

The next disaster was a Thorn 9000 I'd sold some years ago. Its owner had mucked about with the fuses. Having got these right I checked the diode (W702) in series with the syclops transistor — on the transistor's surround — and found that it was short-circuit. So I replaced it and checked the syclops transistor itself and the 47 $\Omega$  resistor connected between its base and emitter. This was well down in value, so I removed it — the test was made with one end disconnected — and fitted another. I then switched the set on. All I could hear was a soft tripping noise. I disconnected this, that and the other (the tripler etc.) but the tripping continued. So I put the set on one side and got on with some less mysterious jobs.

Having polished these off I returned to the 9000, this time on its side, and found that there was a short across one of the rectifiers (W706) supplied by the syclops transformer. It wasn't a dead short, so I made another check on the other side of the 5 $\Omega$  surge limiting resistor R712 and this time found a dead short due to the reservoir capacitor C715 (22 $\mu$ F). This was removed and the set was tried again. It started up nicely, so I switched off and fitted a replacement electrolytic. The set behaved itself and sat there as good as gold, waiting to be collected.

On checking through the books and looking up devices as I encountered them I came across a couple of absentees, but these were specific manufacturers' types that don't have equivalents. I was pleasantly surprised by some of the things there are included, in particular a large number of numerical only types and the various prefixes used for zener diodes – ZPY and RD for example. Some devices used in Salora equipment caught my eye – RGP10, RGP15 and S2000a are all there. This is bound to help those who have to tackle all types of repair for their living. For example, if one of the multitude of cheap portables comes in with a duff regulator that takes you just ten minutes to diagnose you may then take forever trying to find a replacement that you can guarantee. Or

say you have an i.f. fault and it must be in one of two chips but you don't know which one houses the audio detector and you've never come across either device before.

When these books are updated no device is ever left out, no matter how old it is. So you can buy these two new books and give your pile of existing ones to a field engineer or your apprentice. In my opinion they quite obviously represent phenomenal value. In the short time we've had them they've saved us a great deal of time. They are available as a pair for a mere £17.85 trade (no VAT with publications!) from Willow Vale Electronics (head office 11 Arkwright Road, Reading, Berks. RG2 0LU) under order code 21-004B.

## *The Temptation of Tiny Tim*

**Les Lawry-Johns**

Tiny Tim was having a rest after doing nothing for the best part of the morning. The door opened and in walked delicious Dora. What a face, what a figure. And what a cheek . . . her lips parted as though to give Tim a kiss.

"Would you be kind enough to bring my set in for me? It's a bit heavy for me to carry."

Tim popped out to her car and picked up the Thorn 8800. He carried it into the shop and put it on the counter.

"Can I watch you do it?" asked Dora.

As Tim's wife was out, gassing to everyone up the farm (King's Farm, about a mile up the road), he didn't mind at all. He whipped the back off and plugged the set in, switched on and nothing happened. Next he checked the plug and mains lead, read it through to the on/off switch, then realised he'd fallen for it again. The cut-out button at the back. He pressed it and the set started up. The sound was o.k. and after a short period the picture appeared. It was blurred, so he tried to adjust the focus knob. It was at maximum and turning it back only made things worse.

Tim remembered the time when he'd changed the e.h.t. unit and the focus control several times without improving things and Keith and Alex had popped in on their way back to Portsmouth. Keith had offered to do the job for him there and then. He'd removed the earth lead from the bottom of the focus unit and switched on. There had been an almighty crack from the tube, with flashes everywhere. Keith had then switched off and reconnected the earth lead. On the next attempt the picture appeared in full focus and Keith and Alex had then made their way back to Pompey, having taught Tim another lesson.

Tim thought of trying this again, just to frighten Dora out of her life, but decided against it. He slid the chassis out – with the set switched off – and loosened the e.h.t. unit. After shorting the e.h.t. lead to chassis he disconnected the leads. He walked round, brushing Dora's behind on the way, and selected a new unit from the shelf.

"This will cost you twenty quid" he told her.

"We can talk about that later" Dora said.

So Tim fitted the new unit and switched on. He could now turn the focus control quite a way back and the picture looked good.

"Aren't you clever!" said Dora.

"At most things" Tim said modestly.

He wrapped the set up and carried it out to Dora's car, then went back for his twenty quid.

Dora was leaning against the counter in a suggestive way. "Open to negotiation?" she asked.

Now Tim fancied Dora but, well, maybe it was the weather . . . He's an odd bloke but there are plenty like him. Dora looked annoyed. She opened her purse just as Tinker Bell returned, having cut short her shopping (jawing). Tim took Dora's notes and, as she left the shop, put them in the till.

### **An Awkward K30**

Tim had a Philips K30 that was driving him mad. He'd sold the set some years back to a lady whose husband had been a friend of his and had died two years ago. When she'd phoned to tell him about the set he'd promised to call round that afternoon. He'd gone without a care in the world, taking with him all (he thought) the things he might need.

When he tried the set there was sound but no raster. He replaced the two upper left-hand boards. No difference. He turned up the first anode controls and obtained a blank raster that was locked solid until the aerial was disconnected. So he took the set back to the shop and spent hours trying to find out why the first three transistors on the RGB output board were not turning on. All the supplies to the board were present.

After suffering for a long time he thought he'd let someone else suffer. He took the set along to Moon Lane and handed it to Geoff and Eddy. They laughed when he asked for their help. Two days later he called in to find out whether they'd solved the mystery. They hadn't and the set sat there on the bench, looking at them with the same blank raster. Tim said he was sorry to have given them such a trial. They didn't laugh this time and carried the set down the stairs for Tim and put it in his car. Said they were glad to see the back of it.

Tim settled down to find the source of the trouble but became more and more baffled. The cause of the problem seemed to be lack of bias for the first three transistors on the RGB panel. They are pnp emitter-followers with their collectors returned to chassis and their emitters supplied from the 13V LT3 rail. After a lengthy search Tim found an invisible break in an earth circuit, roughly midway across the main panel near the focus control. Three electrolytics (including the LT3 reservoir) and a resistor are returned to earth at this point. Tim was left very puzzled as the other open-circuit electrolytics and the resistor, which is in the first anode network, should have had other effects. Maybe the break was "made" as far as some of them were concerned.

# Hi!

**Les Lawry-Johns**

Greetings not only from me but also from Rick Kinslow of the Medway Towns. He wants to be remembered to all his friends who used to work so well together at Southern Rentals (Hove and Brighton) in the old days.

## Problem Fidelitys

I'd like to thank David Botto for his article on the Fidelity ZX3000 chassis in the September 1986 issue. As you know, I've been a bit muddled for some time now. When I was trying to fix this CTV22R with the ZX3000 chassis I couldn't concentrate properly at all – the set just kept blowing the h.t. fuse and the BU426A chopper transistor as soon as I switched it on.

I thought I'd checked just about everything – I'd changed all the obvious components. Then, in the end, I took time off to go through my back issues. At last I came to David's article, where he drew particular attention to R91 (270k $\Omega$ ) which is connected to pin 4 of the TDA4600 chopper control chip. I'd run the meter over this item, but I hadn't disconnected one end. When I did I found that it was open-circuit. A new one was fitted as quick as a flash, along with a new BU508A (I'd run out of BU426As).

With a new fuse in place I switched on again, averting my eyes – the flash when the fuse had blown previously had not been very pleasant. This time there was no flash. The set started up and a nice picture appeared. Years ago I

would have remembered reading about that, but lately I've been re-reading some of my own articles and wondered just how I wrote them. I seem to have forgotten so much except what occurred forty or fifty years ago, and that's not much good to me now. At least I don't think it is.

Shortly after the above incident a Fidelity CTV14R (ZX2000 chassis) came in. It wouldn't start up. It was also in a bit of a mess, and someone had fitted a pair of resistors in series to take the place of R801 (18k $\Omega$ ). This resistor, with the 12V zener diode ZD5, provides a stabilised supply for the emitter of the chopper driver transistor and the TDA2581 chopper control chip. It wasn't until I'd fitted a proper wirewound resistor in place of the two series resistors that the set started up and worked properly. This despite the fact that the "faulty" resistors seemed to measure right and ran quite warm. Oh well . . .

## The Fry Up

Eddie Fry came in with his set. His wife is French so we call him French Fry. A bit naughty perhaps but it seemed reasonable to us (HB and me). His ITT CVC5 had been going well but had then just given up. He said the picture had come in from the sides, jumped back out again, then the set had gone off. He also said he'd be back later.

So I whipped off the rear cover and checked all the usual things – the fuse in the h.t. supply to the line output stage, the boost capacitor, etc. Then I noticed that one end of the line output valve's screen grid feed resistor R421 (2.7k $\Omega$ ) was free. I soldered it up and switched on. The h.t. came up all right but there was no life from the line output stage after several minutes' warm up. A voltage check revealed that there was no voltage at the line output valve's screen grid: so the resistor I'd soldered up was open-circuit after

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all. This aroused my suspicions, and I accused the PL509 of having an internal short. The excess current passing through the resistor must have melted the solder just before the resistor itself had given up. When the resistor was removed there was a black mark on its side. A nice new 2.7k $\Omega$  resistor and a new PL509 restored normal operation and a very good picture – I never stop to marvel at the goodness of the tubes fitted in these sets, after all the years of service they've given. The 22 and 26in. tubes seem to last for ever.

Why no sound? Well, if you remember your ITT hybrids, the sound output stage is muted until the line timebase gets going.

### The Thorn 8000

This one came in about an hour ago. Its owner, Mr. Cheapskate, said he was willing to pay up to a fiver on it. So I told him to take it away. He laughed and said he was only joking.

I switched it on and it tripped like mad. With the e.h.t. rectifier unit disconnected from the line output transformer

it continued to trip. I lowered the right side (looking from the rear) timebase unit and tried again. This time I saw smoke rising from the 3.3k $\Omega$  resistor in series with the rectifier that provides the supply for the c.r.t.'s first anodes. I looked at the associated 0.047 $\mu$ F, 1kV white capacitor (C401). This item has always given up easily. I fitted a replacement and ran the set up again. A perfect picture appeared and Mr. Cheapskate was delighted.

"There you are then" I told him. There's your £5 job. Now take it away before I look at the set properly.

### Post Strike

The post strike was still on while this issue was being prepared. I wondered what the editor would do if he received nothing in the post? What he could do is to reprint some of the better of the old pieces, a request that several readers have made. I wonder how it would go down? In the end the editor's inestimable assistant Tessa took this all down over the phone. Why didn't I Fax it? Well these newfangled machines are not all that thick on the ground yet in this neck of the woods.

## Blanking Pulse Generator Circuit

John de Rivaz, B.Sc. (Eng.)

Those still using sets fitted with the Rank A823 series chassis will have noticed that over the last few months white lines have appeared at the top of the screen — the effect is particularly noticeable on Channel 4. These lines are caused by additional text services introduced for closed user groups. They benefit the viewer only in as much as the charges made for the new services contribute towards the cost of the broadcasting services.

One possible way of removing these lines would be to modify the field timebase to produce a faster flyback, but this would undoubtedly put strain on components that weren't originally designed to withstand the changed conditions. An alternative approach was therefore tried.

### Circuit Description

A simple two-transistor monostable multivibrator circuit that provides a positive-going pulse of sufficient duration to blank out the unwanted text signals was designed and built. The circuit is shown in Fig. 1. R1 was added to prevent instability, and the value of R2 may need to be selected to obtain a long enough output pulse. You could use an 0-20k $\Omega$  potentiometer to set this up. Reduce the value of R3 if the blanking is insufficient.

Since the two transistors operate as switches a collector load resistor for Tr1 didn't seem to be necessary. If the transistor used in this position is slightly leaky however a load resistor connected to the positive side of the supply may be required. Hopefully the value shouldn't need to be less than 100k $\Omega$ . A BC384L or similar transistor is suitable in the npn position and a BC212L or similar device can be used in the pnp position.

The circuit was powered from the A823 chassis' 18V rail, which is convenient as this is used by the field timebase. The input pulse for the circuit was tapped from the collector of the upper BD131 transistor in the field output stage (5VT11 on the A803 panel used in earlier versions of the A823 chassis, 5VT9 on the A802A panel

used in the A823A and later versions of the chassis).

R3 and the 1N4148 diode should be mounted at the input to the luminance delay line, with a wire running from them to the timebase board. The diode is reverse biased via Tr2's collector load resistor when the blanking pulse is not present. Thus when Tr2 is off the existing luminance circuitry is loaded only by the diode's capacitance, which is negligible. The new circuit can be made using a tagstrip or piece of Veroboard fitted with stiff wires to the 18V supply smoothing electrolytic (5C24 on board A803, 5C36 on board A802A).

To avoid unnecessary disturbance to the picture, the blanking pulse is wide enough to only just remove the unwanted lines. Some of the teletext lines and the pulse and bar test signal remain in their usual positions off the top of the screen. The effect of adding the pulse is to shift the video signal in a positive direction: as the circuit is d.c. coupled at this point this action is sufficient to blank the screen.

### Other Sets

Other old sets that suffer from this problem could be modified in a similar way, though the circuit may have to be arranged the other way up to provide negative-going pulses if these are easier to apply to the video circuitry.

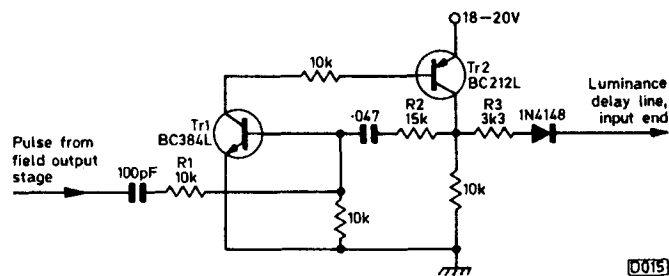


Fig. 1: Pulse generator circuit to provide field flyback blanking pulses in the Rank A823 chassis.

# The Butt of Lewis

Les Lawry-Johns

I'd spent an interesting morning repairing three colour sets and a Pye cassette recorder, all for next to nothing because their owners always seem to be able to give me a good reason why they shouldn't be charged and, being the fool that I am, I always seem to see their point of view. Why doesn't my bank manager see mine?

## SEME Stan

Just as I finished the last one Stan (from SEME Ltd.) came in to take my order (small). I gave him the list and while he was writing it down I noticed the thing sticking out of his top pocket. It had a little red light on it, and suddenly started to bleep. "Why don't you answer it?" I asked.

"It won't talk to me" Stan said. "I have to phone them."

"Well phone them then and stop that racket" I said crossly.

"O.K." said Stan, "can I use your phone?"

"Of course you can" I replied. "I'll go and make your coffee with no milk and sugar."

So Stan phoned back to base while I plied my way in the kitchen. When I came back Stan looked white and shaken.

"I don't know" said Stan, "I've to go to the Outer Hebrides to placate a bloke called Tim Tiny or something like that. I know it's a familiar name, but I can't recall upsetting anyone that far away."

"I hope the sea is calm for you" was all I could think to say.

So Stan staggered out whilst I sat behind the counter wishing I'd not phoned SEME the previous day, saying I'd been dissatisfied with Stan's service on his last visit to me at the Butt of Lewis. I hope Mr. Bullock will bump into him and calm him down. I know he's up that way but I can't remember where exactly. Sorry Mr. Bullock. Hope Stan makes it across those waters. I wonder why I feel a little guilty?

## The GEC 3135

I felt guilty about this little GEC monochrome portable too — Model 3135. When it came in it refused to work at all, but it's a nice little set so I got on with it with the best of intentions.

The fact that it didn't work at all suggested to me that the trouble was in the power supply. I checked everything on the rectifier panel then decided to look up the circuit — in the 1976-77 volume of *Radio and Television Servicing*. With my muddled mind it took me a long time to make sense of it — it's the set with the switch-mode pump circuit, a single transformer being driven by the pump and line output transistors.

I decided to try it out with a battery supply. With 12V d.c. input the sound burst out and I concluded from this that the set would operate with a battery. This was silly, because I hadn't checked whether a picture would appear. I then reverted to mains operation and continued my search, beginning to realise what an idiot I'd been.

There was 250V at the collector of the switch-mode pump transistor TR451, which is adjacent to the switch-mode/line output transformer, but nothing at its base or emitter. A more careful study of the circuit suggested that a fault in the line output side could cause this condition. After a bit of a struggle I checked the line output transistor TR203 and found that it was short-circuit. At this point I decided to give the customer an estimate and wrapped up the job until I'd got his O.K. to proceed. When he came back he declined and took the set away. Another waste of time. Only mine so it doesn't matter.

## The Decca Portable

Shortly afterwards a young chap carried in a Decca colour portable. He said it had just arrived and was brand new but couldn't be tuned in.

I plugged it in and fitted the aerial plug. One front button selected the channels: the next two to it were for tuning up or down and the right side single button was for memory store. I selected channel 1 and pressed the lower search button. The screen lit up with a mass of grain and faint (TVS) channels drifted through. London BBC-2 appeared and I pressed the button once more in case the set lingered. Down we subsequently went and Channel 4 appeared, only to vanish as the set continued on its way down. BBC-1 appeared next, and I pressed the memory button to keep it on switch position 1. I then selected position 2 and repeated the previous procedure, pressing the memory button when BBC-2 appeared. This business was repeated for ITV and Channel 4. The young man was amazed.

"How did you do that? I'd tried for hours."

"You were probably going up instead of down" I suggested.

So having paid me a pound for the job he packed up the set and whilst doing so mentioned that it had arrived by parcel post that morning, having been ordered from a club. This explained why he hadn't be able to call for help from the suppliers.

## Return of the Intrepid Duo

Shortly after this a large, expensive car drew up outside (like I used to drive but can't afford to now). Out got Beardy and non-Beardy. "Oh my Gawd" I groaned.

They brought in a 22in. Amstrad of the type that has been haunting me lately.

"Will you just have a quick look at this?" said Beardy.

I stared at it hard.

"No, don't look at it. Find out what's wrong with it while we wait."

So I took the back off and freed the chassis, pulled it out and turned the whole thing up to get access to the chopper transistor etc. The latter was short-circuit, as was the line output transistor. Making allowances for finding the cause of the trouble and the resoldering etc. that would be required I told them that it would cost about forty quid.

Beardy's hair stood on end. "You are joking with us. Forty pounds to repair a TV set?"

"Yes. It was forty pence last time I think but this one will be forty pounds — or maybe more. If you're not happy you can take it and see whether you can get it done cheaper elsewhere. Only don't bring it back here."

So off they went, having found that Uncle Les isn't as daft as they'd thought he was.



tied correctly.

Another thing that can be overlooked when a cap is replaced is the series resistor (if one is fitted). If at all possible, save the original one. It's usually fitted in the neck of the cap, so bear this in mind before removing the old one.

Finally on the subject of caps don't smother them with silicone grease, rubber or other gunges. This will only attract muck and start the problem up again. Look at a new set: it doesn't have gunge around the cap does it?!

Leads from diode-split line output transformers are another favourite for this kind of trouble – I think of Philips, ITT and B and O sets in particular. The leads usually plug or push into the transformer at one end, with the cap on the other end. Again, replace the lead if you are in the least bit suspicious. Don't do what I've seen done – the lead taped up or a section cut out. Remember that the leads are tuned lengths, and again usually have a series resistor. It's perfectly in order to fit a new cap to one of these leads so long as the rules outlined above are observed.

### **Triplers and LOPTs**

If the case of a tripler or line output transformer breaks down the action required is replacement without question, not as some people would have it a quick squirt of plastic

seal over the fracture. These items are critical to safety. The cost of replacement may be high, and this could mean writing a set off and loss of a repair job, but is this worse than being sued for damages when the customer's house burns down as a result of the economy repair? Don't say this won't happen – it has.

### **Plastic Sealing and Silicone Rubber**

I am absolutely against the use of plastic sealing material in e.h.t. areas: it just seals in the fault which will reappear soon. As an aside however I would recommend the use of plastic sealing as the perfect solution for noisy transformer coils, transducers and suchlike – forget wood glue and rawlplugs or whatever else you might use. This is far and away the easiest and cleanest as well as the most effective way of silencing wound components, but always allow plenty of time for the sealing to set before switching the receiver on again.

Silicone rubber, which again shouldn't go within a mile of e.h.t. areas, is perfect for repairing VCR fronts where the buttons that are hinged by the elasticity of the plastic have snapped, usually necessitating replacement which is expensive.

If you're thinking what a load of rubbish this concern for correct action is, just remember Denis Mott's article on "The Legal Aspect" (July 1988).

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## **Still Confused**

**Les Lawry-Johns**

I'm still confused but people keep asking me to do things they can't do. Like the Decca set that came in yesterday. The owner asked if he could stay as he lives a long way from here.

### **Trouble with Triplers**

As it was tripping I started by disconnecting the tripler. This stopped the tripping so I told him how much it was going to cost him. He agreed and I reached for the last new universal tripler. I didn't get it down but instead I looked at the one fitted. As it didn't have a diode lead I decided to fit a spare Philips G8 tripler which was next to the universal one. This was duly fitted and connected – as the e.h.t. lead was a bit short it had to be fitted with the chassis lowered. I then switched on. The sound boomed out and I waited for a picture to appear. And waited. I turned up the brightness. Still no picture.

I checked the e.h.t., which was present, so I moved to the tube base voltages. No first anode supply. Something stirred in my befuddled mind. I cut the mauve lead at the bottom of the right side panel, intending to try an alternative supply. Big sparks came from under the line output transformer, so I hurriedly reconnected the cut lead. There was no model number on the rear cover but I was pretty certain it was an 80 series chassis, so I looked up the circuit, aware that I'd done this only a short time ago. There's no separate rectifier diode for the first anode supply. I then recalled that last time I'd changed the tripler I'd fitted a universal type with the diode and earth leads connected.

So I reached up for the last universal type and hurriedly

fitted it. A picture appeared, too bright because I'd turned up the first anode controls. I turned them down and then turned down the colour to set up a good black-and-white display. Having done this I turned the colour up and the customer commented that it was the best picture he'd seen on the set. I apologised for the delay and he continued:

"You ought to be working in a government factory experimenting with things that won't go right . . ."

He paid up and departed and just at that moment Rick Kinslow drew up in his car. In his hand he had a tripler that looked like the one I'd just changed.

"Have you got a tripler for a Decca Les?"

"I've just used my last one."

He looked up on the shelf. "There's one" he said.

He took down one that I'd taken to be another type, but I could see the difference.

"Take it and try it" I said, ashamed of myself for not having seen it. All the trouble I'd brought upon myself for not looking properly. Oh well.

### **Processions**

I then had to cross the road to post a letter. Half way across I was amazed to see an army of ants marching down the road in perfect step, carrying banners.

"What's that on the banner?" I asked.

The ant carrying it looked up and angrily snapped "it's God of course".

"But it looks like an ant to me."

"Of course it does. What do you think God looks like?"

"Well", I faltered, "God made man in His own image".

"What do you mean His own image? You've given Him a gender!"

"Those males always do" a female ant shouted. "They think they're God and they could well destroy our planet within a few years. Why doesn't their God stop them?"

I ran over to the post box, a bit fed up with these processions that keep coming by. They'd gone by the time I got back.

# Still Swimming

Les Lawry-Johns

First I'd like to thank John de Rivaz for his helpful suggestions on medical matters. I think however that for the time being I'll carry on in this daze and see how things turn out. Maybe it's something to do with all those TV sets over the years. It could of course be the effects of whisky, about half a bottle per night, just to keep the blood thin you understand. But it could affect my head as well. Something's wrong, because I can't repair some of the Bush models that keep coming in – the T20s and T22s I've written so much about over the years. Lately they seem to be beating me.

## The Decca/Tatung 120

Then there was the Decca (Tatung) set that came in the other day. Fitted with the 120 series chassis. It kept blowing the 1A d.c. fuse in the power supply. I checked the BU426A chopper transistor and found that it was short-circuit, so I looked around for a reason. R810 was open-circuit. It's 150kΩ, so I fitted two 330kΩ resistors in parallel in its place. With these, a new BU426A and fuse the set worked all right, making me feel a little better. But I still wish all these people wouldn't keep coming in and expecting me to work miracles on their sets for nothing, saying things like "I'd do it myself but I haven't got the time".

## Arcing

This happened when a bloke brought in a Ferguson set fitted with the TX10 chassis. The focus unit was arcing over and I'd just used my last one. I released the screws that secure it to the chassis, hoisted it up and secured it well clear of the metalwork with insulating tape. After that it performed quite well and the chap was pleased to take it away, tending not to hear me say "on your head be it". A similar sort of thing happened some time ago when I was out of triplers for an hour or two. A Ferguson set was brought in with the tripler arcing over to the metal frame on which it's mounted. I released it from the frame and let it hang down by an inch or two, suspending it in this position with tape. Once again the remedy was successful and the customer departed in high spirits, having had an estimate for a lot of money somewhere else. I'll learn, some day. Cries of "when?".

## A Relative's G11

Look what happened when a relative brought in a large Philips set fitted with the G11 chassis. He complained about the bottom of the set scratching the large table on which he kept it at home. Not looking at the set properly I turned it on its side and removed the screws securing the bottom box. When I swung the box open I was surprised to find a large panel containing over sixty i.c.s and lots of other stuff.

"It's got teletext and viewdata" explained my relative. I unplugged the panel and removed it. Next I tucked all the leads inside the cabinet and, after a struggle, removed the housing. The set looked more normal and we swung it

upright to test it. On switching it on there was a good picture with normal sound on all channels.

"You won't get teletext and all that lark" I told him.

"That's all right Les, as long as that bottom bit's no longer there."

I helped him take the set out to his car and he drove off in good humour, leaving me with his unwanted bits and pieces, including the complicated panel. I kept looking at it and felt pleased that I wasn't expected to repair it.

## The Decca Hybrid CTV

Here's another example of the daft things that keep happening here. A Decca colour set was brought in, fitted with the late hybrid chassis. The complaint was excessive red. To save me having to think I changed the video panel. The resultant display was nicely balanced. I tried the pushbuttons and tuned one of them for London reception, at the same time noticing that the others weren't all that good at holding in. The owner had said however that all he wanted done was the red picture, nothing else. When he came to collect it I showed him the panel and mentioned the pushbuttons. He said they were all right and agreed that the picture was good. So he paid up and left.

Just as I was eating my lunch the phone rang. It was him again, moaning his head off about the buttons and saying it must be because of the new video panel I'd fitted. I told him that the panel had nothing to do with the buttons, and that there was nothing more I could do as he didn't want to bring it back to the shop. So that's it. He'll have to keep hitting the buttons until they click in.

Well that's it for now. Be seeing you!

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# Failure and Success

**Les Lawry-Johns**

I seem to be giving up more often when confronted with faults I could put right without thinking about it a couple of years ago. Take the Fidelity CTV14R that came in the other day. The rear-mounted 18k $\Omega$  wirewound resistor that feeds the 12V zener diode ZD5 was open-circuit so I replaced it. Switching on brought no response however. There was h.t. at the collector of the chopper transistor but it wasn't being switched on. I checked the driver transistor and all the components associated with the TDA2581 control chip, including ZD5. A couple of items didn't read right: I replaced these but the set still didn't work. So I gave up and admitted defeat.

Then look what happened just before Christmas. A woman brought in an ex-rental Multibroadcast set for repair. I told her I'd phone when I'd found out what was wrong. It turned out to be fitted with the Thorn 9000 chassis. The tripler and a couple of other things had gone, par for the course with these sets. I phoned her and gave her an estimate for thirty pounds. At this she said most emphatically that she didn't want the set done because she'd paid only seventy pounds for it about two years previously and had had to spend money on its since. She

told me not to do it and the set stayed in the shop into the new year.

Honey Bunch started to moan about the sets that had been left with us. Said they were cluttering up the shop. So when this chap came in and asked if we wanted anything dumped I pointed to the front row and he took them away. This included the Multibroadcast set. Several weeks later a chap came in and asked to collect it. I told him it had been dumped and told him he could take another working set in exchange for it. He took a nice 20in. Ferguson model and I didn't hear any more for a week or so. Then the woman phoned to say that she wanted her Multibroadcast set back. I told her it had been disposed of as she hadn't wanted it done and I couldn't keep sets that weren't collected. She said she'd sue me unless I could produce an identical set. I'm still waiting and the threat has been repeated. Oh dear!

I do have the occasional success however, sometimes after a struggle. Take the Philips G11 that came in recently. I repaired the line output panel and thought that was that. It wasn't. The picture was dark and the brightness control had no effect. Checks showed that there was a short from one end of R6065 to chassis until plug 6C was removed. This led me to the power supply panel where zener diode D4090 (BZX79-C4V7) in the beam limiter circuit had gone short-circuit. Fitting a replacement produced a good picture with full control. I'm still waiting for the set to be collected . . .

## Book Reviews

**An Introduction to Satellite Television, new edition, by F.A. Wilson, published by Bernard Babani (publishing) Ltd., The Grampians, Shepherds Bush Road, London W6 7NF at £5.95.**

Such is the interest in satellite TV that a new extended and updated edition of this book, which first became available early last year, has now been published. It's a useful handbook for any technician thrown in at the deep end by the coming of Astra and BSB, beginning with the basics and ending with the maths. Its prime virtue is that it deals with today's requirements in the UK – so many recent books have been written mostly with the C band used in the Americas in mind. **H.P.**

**Getting the Most from your Multimeter by R.A. Penfold, published by Bernard Babani (publishing) Ltd., The Grampians, Shepherds Bush Road, London W6 7NF at £2.95.**

Electronics changes so fast that the basics tend to be ignored – with test equipment meters are neglected in favour of more sophisticated gear. A good multimeter will however usually tell you just about all you need to know about a circuit, provided you use the right sort and apply it correctly. This book shows you how. **H.P.**

**Newnes Guide to TV and Video Technology by Eugene Trundle, published by Heinemann Professional Publishing, Halley Court, Jordan Hill, Oxford OX2 8EJ. Paperback edition £8.95.**

This book is a successor to two well-known Newnes Guides – to colour television and VCRs. The material from the earlier books has been revised, updated and added to for this single-volume presentation. Its well over

400 pages contain a great deal of basic information on television and video including such up-to-date subjects as MAC encoding, satellite TV reception and S-VHS. The book is not intended for those well versed in these matters, but can be recommended as an easy to follow introduction for those new to these subjects. A careful study will provide a good grounding in TV receiver and VCR operation in fair depth, and the book will afterwards serve as a handy reference. It can be obtained by post at an inclusive price (in the UK) of £9.95 from Paul Richards Books, 28 Boscobel Road North, St. Leonards on Sea, E. Sussex TN38 0NZ. **J.A.R.**

**More Advanced Power Supply Projects by R.A. Penfold, published by Bernard Babani (publishing) Ltd., The Grampians, Shepherds Bush Road, London W6 7NF at £2.95.**

This sequel to "Power Supply Projects" is really intended for the enthusiast. Because it features modern regulator chips however it's a handy book to have around. Particularly useful if you have a power supply problem with an older piece of equipment and decide to replace the whole thing with one of the current three-legged devices. **H.P.**

**IBA Technical Review No. 24: The D-MAC/packet System for Satellite and Cable. Available to bona fide technical personnel, engineers and students by application to the IBA, Engineering Information, Crawley Court, Winchester SO21 2QA.**

The IBA began publishing this series of Technical Reviews in 1962 – No. 2, the Technical Reference Book, has become almost the standard work defining the parameters of System I. This latest book looks like becoming the standard work of reference on D-MAC, and is a must for those who will have to deal with MAC equipment or explain its operation to others. The overview alone settles a lot of previously unanswered questions, especially as to how the system is intended to be progressively developed

# Strange Things

**Les Lawry-Johns**

Some odd things have been happening to sets around here. Take the two Ferguson TX9s that came in recently.

## **A Couple of TX9s**

The first was brought in by a chap from just over the road. He said the colours were wrong – blue faces etc. I told him to call back later and started on it. The faces were certainly blue, as was the colour of the snooker table. I checked everything thoroughly, first the resistors etc. on the tube base panel then back to the output transistors on the main panel. There was nothing amiss so, feeling a bit of a fool, I removed the RGB drive leads from the tube's base panel. Red at the bottom, blue in the middle and green at the top. I put the red lead at the top and the green one at the bottom. The faces then looked all right but the fields were blue. So I changed over the green and blue leads, which produced green fields and a green snooker table. We now had the blue lead at the bottom, the green lead in the middle and the red one at the top. I didn't like doing this and it worried me. The set was left working all day and when the chap came back I told him what I'd done. He looked at the picture and said it was perfect. I asked him whether anyone had worked on the set and he said no.

So what had gone wrong to make it necessary to swap over the drive leads? The manual says that the green lead should be at the bottom, the red one in the middle and the blue one at the top. Surely the cathodes can't change their colours in this way? The leads looked to be undisturbed, correctly wrapped round – now they are soldered on. The set continues to work well. Strange.

The second TX9 came in with intermittent field collapse. I fitted a new TDA1170S field timebase chip and the set worked for several hours. Then suddenly the field collapsed again and when I pulled the chassis out the field scan was restored. I tapped around and it collapsed again. Next I found that there was no voltage at D94, the rectifier that provides the 24V supply for the field timebase. After a lot of mucking about I discovered that the field collapse came and went when pin 12 of the line output transformer was tapped – it connects the earthy side of the winding that feeds D94 to chassis. I cursed myself for not thinking of this earlier and remade the joint. No amount of tapping had any effect after that. Another easy job made difficult by my bungling.

## **Fidelity Problems**

Fidelity CTV14Rs (ZX2000 chassis) never used to give me any trouble. One came in the other week and seemed to work fine after I'd fitted a new line output transformer. Shortly afterwards it came back. This time I found that the BU208 line output transistor was shorting intermittently. On the last time it had done so it had blown the BUW84 chopper transistor. So I replaced both transistors and the set worked fine. Until next morning, that is. When I switched it on there was a loud bang. This time the BUW84 had shorted, blowing the mains fuse. I checked everything and fitted a new line output trans-

former, a new BU208 (just in case), two new bridge rectifier diodes, another BUW84 and a mains fuse. The set then worked normally but next morning there was another loud bang at switch on and I was back at square one. Why should a set that works perfectly when repaired go bang next morning? To cut a long story short, apart from two line output transformers, three BU208s, several BUW84s and of course fuses I must have fitted at least a dozen mains rectifier diodes before the set would work reliably.

When the owner came back I told him what had been happening to the set, and to me. He took it away and gave me back an aerial amplifier he'd purchased a week before, refusing to take any money for it. There are some nice people about – I'd begun to think that they were getting to be a bit thin on the ground.

Incidentally I'd like to thank those nice TV boys in Plymouth who repaired my daughter's Fidelity set – the one I'd given her some time ago. I hope it didn't give them as much trouble as the set just mentioned. I also wish they'd come and fix this CTV14 (ZX3000 chassis) that came in with a blank white screen. The lady who brought it in said there wasn't much wrong with it and I'd be able to do it in no time.

I thanked her and started on it. The screen was bright with white lines across it. So I turned down the first anode knob on the line output transformer and changed the TDA3562A colour decoder chip. With the new chip installed a picture appeared. I'd turned the brightness down, and when the controls were readjusted there was a good monochrome picture. But when the colour control was turned up the picture remained in black and white. She said the set required only minor treatment so I gave it up and returned it. I feel ashamed of myself, but there it is – I'm getting old and don't want to do things for nothing.

## **The Pye G11**

A Pye G11 came in recently with no sound or vision. I did my usual checks before switching on – the mains and h.t. fuses all seemed to be intact. So I switched on and heard the e.h.t. rustle up. But there was no l.t. supply at the lower left side i.f. panel. When the line output panel was swung out I found that the lower, 1A l.t. fuse was open-circuit. After switching off I checked from the fuseholder to chassis. There was a dead short which disappeared when the long socket was unplugged. So I turned my attention to the lower left side i.f./tuner panel, having refitted the socket on the line output panel.

As the short was still present I suspected the 12V regulator. When I removed the power input socket however the short disappeared. I started to frown at this and went back to the line output panel. Removing the socket here once more cleared the short. So what was I up against? A short in the wiring? I checked for this but there were no shorts.

It appeared that the short was present only when the socket was connected. I then did what I should have done in the first place. I again removed the socket, then checked from the fuseholder to the panel's true earth (not the frame). This time the short showed. A look at the circuit suggested that the LT1 supply's reservoir capacitor C1350 was the culprit, and when this was removed all was well. A new 150 $\mu$ V, 50V electrolytic restored the sound and vision and after a final check it was time to write out the bill. Another example of making life difficult for myself . . .

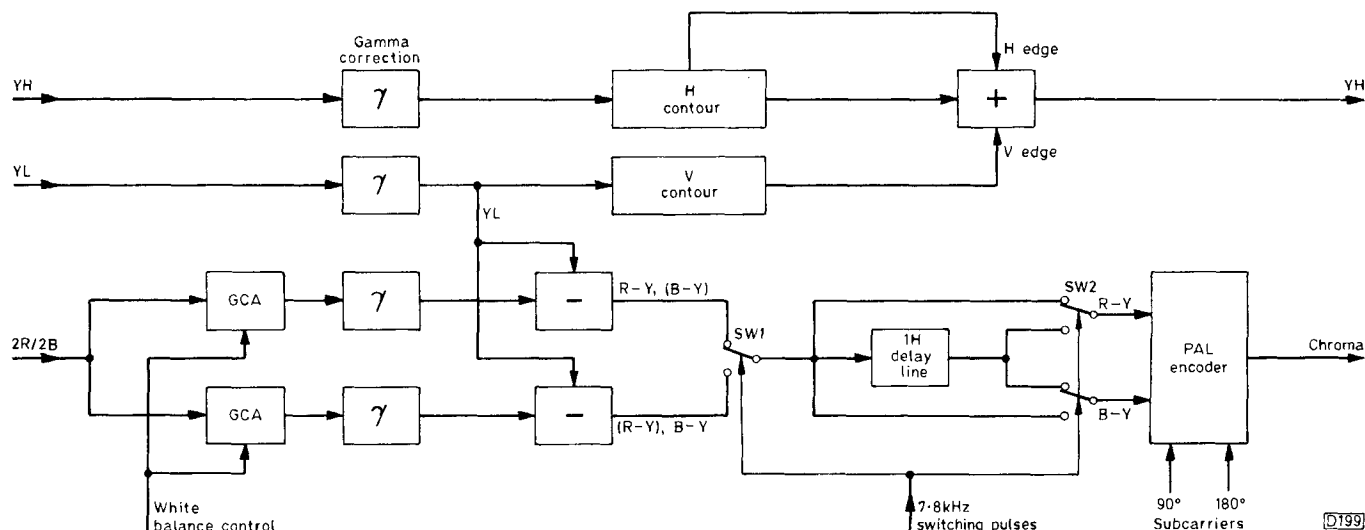


Fig. 9: Block diagram of the circuitry used to produce Y plus simultaneous colour-difference signals.

applied to add and subtract circuits which produce YL and, on alternate lines, 2R/2B as in the previous example.

The line-sequential R and B signals must next be converted to simultaneous R - Y and B - Y colour-difference signals. This is where the one-line delay line comes in. Fig. 9 shows the arrangement used. The two luminance signals are passed through individual gamma correctors to ensure linear light input/output voltage characteristics. Horizontal and vertical edge correction is then applied to the full-bandwidth luminance signal to crisper the picture. The 2R/2B information is fed to two separate paths each incorporating gain-controlled amplifiers for white balance and gamma correction. Subtract circuits then introduce the low-frequency Y signal, resulting in line-sequential colour-difference outputs (R - Y/B - Y). Use of a delay line and half line-frequency switches SW1

and SW2 finally provides simultaneous R - Y and B - Y inputs for the colour encoder. A point to note when servicing is that the two 2R/2B channels are designated the red and blue channels respectively, which could be confusing.

Our account of the colour signal processing in this article has been somewhat simplified to make it more readily understandable on first acquaintance. Those who would like to follow through a more detailed account may refer to pages 178-183 of the present (third) edition of my book "Videocassette Recorders - a servicing guide", published by Heinemann Professional Publishing at £20. Another point to note is that a four-phase clock pulse drive system is used for the vertical shift registers in CCD-type solid-state image sensors. Again you will find more on this in the book.

## The Party's Over - Well Almost

Les Lawry-Johns

It's time to call it a day. Not only the song goes like that. We don't get any younger and the health problems are very persistent. As far as the business is concerned the party is over and we have to pick up the pieces and pay our debts, if we can. Us careful ones haven't got much to worry about but I know that there are a lot who have. Some years back I wrote about my Grandad. He was the skipper of a ferry boat and it was only when he bumped into Tilbury landing stage that it came out he couldn't see. After that my mum had to go across the road to get his pint of beer. The last act was on for him then, and it seems like only yesterday. Some sixty years ago I think. If anyone wants to look up the issue where I wrote up the story it was in October 1979. Yes the party is finally over as far as this shop is concerned. We're moving out soon, into a small bungalow not too far away. So we'll get a bit of a rest, but I'll still do my bit of writing to keep in touch with you.

### More Sets

In the meantime the sets keep coming in.

Take the Philips CTX-E for example. The note said "no go". So I immediately dived for the switch-mode

power supply. The BUX84 chopper transistor was open-circuit. I replaced it and plugged the set into the mains again, having left it switched on. Nothing happened. I checked around the BUX84 and found that it wasn't being driven. So I checked through the circuit but couldn't find anything wrong. When the owner came for it I had to tell her that I hadn't been able to find the fault. She left with the set and it was only later that I realized it had been a remote control model without the remote control unit. I hadn't done anything other than plug it into the mains. What kind of fool am I?

To show you what kind of fool, I've been looking through past issues of the magazine to try to refresh my failing memory. What about this? In the March 1982 issue I was rabbiting on about the weather and mentioned about my friend Ridley coming in. "If we keep burning fossil fuels at this rate Leslie, the greenhouse effect will become so serious we'll all be dying of heat."

Ridley was a solicitor, and that was back in 1982. How did he know then?

Well, that's all I can think of at the moment. People keep calling in to look around the shop and the accommodation upstairs. If we didn't own the joint the party would probably have been over some time back.

reliably displayed on an oscilloscope. By means of thumbwheel switches one of up to 1,250 possible lines in the display (interlaced or non-interlaced) can be selected. The unit works by providing a pulse for the scope's external trigger input. The unit is battery powered for portability and uses PLL circuitry to eliminate jitter. Price is £340 plus VAT.

Rendar Ltd., Durban Road, South Bersted, Bognor Regis, West Sussex PO22 9RL has introduced a comprehensive range of quality BNC, TNC, F and MIL-specification N connectors manufactured in Japan by Marushin. The firm also has a large selection of adaptors to make cross-connection between different types of connector easy.

Litesold has introduced the Project ETC-5 range of soldering stations with electronic temperature control. There are three models, Viper (20W), Cobra (50W) and

Mamba (80). Each has its own dedicated soldering iron with the 5-pin DIN plugs differently wired to prevent damage from wrong insertion. All control units are housed in similar enamelled steel cases that provide full screening and earthing. For further details apply to Light Soldering Developments Ltd., Spencer Place, 97/99 Gloucester Road, Croydon CR0 2DN.

Schlumberger has introduced a new signal generator for testing D-MAC and D2-MAC packet transmission paths and reception equipment. The SI7765 provides comprehensive test patterns and signals to EBU specifications to simplify installation and maintenance of DBS equipment. The price is £4,300-£5,950 depending on the facilities incorporated. A colour brochure is available. For further details apply to Schlumberger Technologies, Instruments Division, Victoria Road, Farnborough, Hants GU14 7PW.

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## Here We Are Again!

Yes, we're still here, but I wonder for how long?

It's thirty five years since I wrote my first article for *Practical Television*, as this magazine was then called. It was the first one in the "Servicing TV Receivers" series. Seems only yesterday, honest. Many of my articles over the years have appeared under pen-names, such as S. Simon. Did you get the joke I wonder? Simple Simon you see! When I read some of those articles now I'm quite surprised. Did I really know all that? There was also Peter Gaymead Frazer and, going back to earlier days, N. Mead. So I must have been a clever fellow, though I didn't realise it.

There must be many of you who can write a lot better than I can and haven't yet reached the winding down stage. You will though. It seems that in my case I've done so much earlier than most people do. I find myself doing daft things but there have been no complaints so far – except from that lady who is going to sue me for chucking out her set after she told me she didn't want it done as it was going to cost thirty quid to replace the tripler etc. and then left it for some time in the shop. She still hasn't returned the set I gave her in exchange and I do wish her solicitor would stop writing to me. I've told him I'm trying to get a white portable, Thorn 9900 chassis, with remote control sticking out the front, but they seem to be a bit thin on the ground. Frankly I'd thought it was the 9000 chassis, but Keith and Alex put me right about that – they popped up from Portsmouth the other day. I've not been right for a long time, which is perhaps why I've not yet sold this shop though I've bought a bungalow and am now in debt to the bank because of a bridging loan. Not for long, I hope.

Sets still come in, though there are very few of them. I never got around to taking in videos for repair. The family's videos, including our own, are taken to Geoff's at Moon Lane for repair. Geoff isn't upset by this as he too is short of TV repairs. I suspect that there are a lot of you in this situation, what with all these imported sets being sold with guarantees that last for years. They'll start to give trouble eventually, but will it be worth repairing them when spares and data are expensive and difficult to obtain?

Be that as it may, perhaps I can briefly return to those early days thirty five years ago. The editor then wasn't our

John. It was F.J. Camm, the magazine's founder, who had his name up front. F.J.'s brother was Sir Sidney Camm of Hawker aircraft fame – he designed the Hurricane, the Fury and all the other famous Hawker aircraft made before and during the second World War. I could give you a long list as aircraft were my all consuming hobby at that time – I can remember giving lectures on aircraft recognition when I was in the Fleet Air Arm – but this interest began to wane as I worked on the aircraft in this country, Gibraltar and Alexandria (just past the stinking tannery). I still have photographs taken at the time and the memories keep flooding back, more so than of what happened yesterday but I dare say there are lots of you like that.

### The Fidelity CTV14R

We had another Fidelity CTV14R (ZX2000 chassis) in the other day. I expected to have to fit a new line output transformer but this wasn't necessary. The complaint was that the picture kept rolling and going off. After a while I discovered that the focus control was damaged. This was no problem since we keep having to remove the focus control in these sets, together with the first anode control, when fitting the ZX3000 series line output transformer. A new focus control was fitted in no time and the picture no longer rolled and hopped on and off. I then noticed the matchstick in the on/off switch. When this was pulled out the switch no longer worked. So in went another, complete with the remote contacts.

I phoned the owner and she agreed to pay what I asked (none of your business!). Anyway she came in later and handed me a twenty pound note and I handed her a fiver.

### Colour Changeover

I'm sorry about the set that changed its colours. Should have realised it was the degaussing unit. But honestly the changeover was so complete I didn't think it could be that. The set lives over the road so I'll hear about it if it mucks about again, and so will you.

That's all for now. Anyone want to buy a famed store in a prestige position? Mr. Fayed from Alexandria perhaps?

divided by two as shown at (b) so that the digital audio information is now in the form of 24 8-bit symbols. Fig. 11(a) and (b) is an expanded form of Fig. 9(a) and (b). In (c) a number of 8-bit symbols containing the subcode and CIRC data have been added. Following this all the 8-bit symbols are translated to 14-bit form and merging bits are added between each symbol, including the subcode and CIRC symbols, as shown at (d). Finally 24 bits of data are added for frame sync. The complete frame consists of 588 bits.

## Summary

The principles we have been looking at, i.e. sampling, quantization, AD conversion etc., are not peculiar to the CD system. As more analogue signals are converted to digital form for various purposes engineers will become all too familiar with these principles. Don't be discouraged if you find it difficult to remember the finer points in digital encoding — this won't in any way prevent you from servicing CD players. As I pointed out in my introduction at the start of this series, an appreciation of the theory on which the equipment you are servicing is based will give

# Thanks a Million

**Les Lawry-Johns**

Thank you for all the kind letters that have been arriving day by day — also the retirement card from John Boyd. I'm glad to know that you are all keeping well (sorry about the thyroid, Harold). You just don't know what these letters mean to me. Although we've bought the bungalow to retire to it looks as if we shall be here in the shop for a while yet — it just won't sell. Plenty of people have come to see it, but it either doesn't suit them or they don't want to borrow the money with the economic situation being as it is.

So I'm sitting here singing to myself with almost no customers, no money coming in and plenty going out. No old age pension either. But I mustn't bore you with the morbid details. You've probably got worries of your own, maybe more than I have.

Anyway we're still dealing with a few sets, like the ITT CVC20 that came in about a week ago with very poor field scan. The picture was only a few inches high, with a bright line across the bottom. I always dread this because it just has to be the most awkward transistor to get at, T10 (TIP33). The voltage readings confused me a bit, but then they always do. Collector right, base about right, emitter high — above the base voltage. So out came the transistor, after the usual struggle, and in went in a new one. A TIP3055, which is what I usually fit. In its cramped position at the top of the chassis, under the line output transistor, bolted to the metalwork. Once it was in there was full height and the picture looked good.

It was collected but came back a few days later, tripping for the first few seconds then lapsing into sullen silence as these sets do when an overload is present. I dived for the tripler and unhooked it from the line output transformer. This didn't make any difference so I checked the line output transistor carefully. It had a leak. I fitted one of my thick BU208A transistors and left off the tripler's contact just in case. This time the set came on, but went off again when the tripler was connected. So I had to fit a new

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you greater confidence and, sometimes, help you to make an informed decision as to where the fault actually lies.

Next month we'll continue with the theory by taking a look at the frame sync, the error correction techniques used and the content of the subcode.

tripler as well. Nothing to do with the first repair, but how do you charge a realistic price?

Shortly afterwards another ITT set came in, this time a 26in. model fitted with the CVC32 chassis. "Dead" they said, and dead it was. I checked the mains input and traced it through to the main deck. My suspicions centred on the CMP30 chopper control subpanel, so I took it out and checked all the resistors etc. As these seemed to be in order I changed the TDA2640 chip and replaced the panel. The set then started up without trouble and a good picture appeared.

A young lady brought in a Fidelity CTV140, saying that the screen was brightly illuminated and couldn't be turned down. When I switched it on there were some sparks inside the tube's neck and further sparks on the tube base. A check on the components mounted on the base panel revealed that the small 33kΩ resistors (three groups of four, acting as collector loads for the RGB output transistors) were overheating. The usual cause of this is incorrect drive from the TDA3330 colour decoder chip, so I checked the voltages at the output pins. The readings were wrong and I suspected that the chip had been damaged by the sparking. Despite a search I couldn't find a replacement. This meant ordering one or two, then seeing them fail after a short time.

I decided to be the coward I've always been. I reassembled the set and when its owner returned I advised her to take it to someone who would have more confidence in themselves, like Moon Television in Moon Lane. Sorry Jeff. Sooner or later I'll have to tell them that you're actually Sun TV in Sun Lane . . .

As I've been busy typing this two women have been standing outside the shop gossiping away. For about half an hour. At last one of them said something that upset me. "As sure as the sun rises in the east and sets in the west . . ." At this I rose and opened the shop door. "The sun doesn't rise in the east and set in the west," I told them, "it only appears to do so because this little planet is spinning around the enormous sun. Now go and do some thinking instead of gossiping all day."

Sorry about that. Cheers to you all. Love from Zeb, Tessa, Spock and that bad-tempered bird. And Honey Bunch of course.



- (62) Sticks on one channel. ICC5, ICC6 or ICC7.
- (63) Won't memorise a station. ICC5, ICC6, DC8, TC5 and CC21 have all caused this fault.
- (64) Scans tuning but doesn't stop when station found. CC12, CC13, CC18, RC31, TC1, TC2, TC3, RC35. Clean the contacts of the plugs and sockets on the microcomputer panel.
- (65) Set won't sweep tune. ICC2, ICC3, ICC1 and CC17.
- (66) Set runs but no control operation, no display of channel number etc. ICC1 or if accompanied by a tick on sound check the smoothing of the 15V rail (CC1, 470 $\mu$ F). This should be checked whenever a segment display fault is noted (see below).
- (67) Display doesn't alter, e.g. stuck on no. 1. ICC1 and check for hum on 15V rail – see (66).
- (68) Segment display goes out intermittently. ICC2 and check 15V rail for hum.
- (69) Green bar tuning display does not disappear from screen. ICC2 and TC4.
- (70) Tuning drift. ICC3, CC12, CC13. See also (16) and (83).
- (71) No control operation for a few minutes from cold. Ensure that TC9 is type BC307B not BC307A.
- (72) Clock runs slow (1F4/8). ICC1 and ensure that RC7 is 1k $\Omega$  not 2.7k $\Omega$ .
- (73) No sweep tuning, display blank. ICC3, ICC6.
- (74) No u.h.f. indicator. ICC7.
- (75) One row of keyboard not working. Check continuity and replace keyboard as necessary.

- (76) One segment in channel display not illuminated. DS1.
- (77) Remote control not working, handset o.k. Check adjustment of RTUA1 (see below) or suspect ICUA1 or CUA2 incorrectly fitted.
- (78) Remote control range poor. CUA8 not earthed or check adjustment of RTUA1 (see below).
- (79) Set intermittently starts from standby on its own. Faulty self-wiping contact.
- (80) Tuning display incorrect. ICCN2 or short out DCN2.
- (81) No display. ICCN2.
- (82) Display always on screen. ICCN1.
- (83) Tuning drift. Add a 2.7M $\Omega$  resistor between pins 6 and 9 and an 8.2M $\Omega$  resistor between pins 3 and 9 of ICC3. Remove the 10M $\Omega$  resistor from pin 6. Also check the 33V regulator ICC4. Add a 1N4148 diode from the 33V rail to (cathode) pin 11 of ICC3, cutting the print to connect the diode in series. See also (16) and (70).
- (84) Set intermittently shows an erroneous channel display. Replace CC4 and CC5 (previously 82pF) with 100pF or add 20pF in parallel with each. If the fault persists replace ICC3.

To adjust RTUA1 (remote control receiver) transmit from the handset and find the ends of the range of adjustment of RTUA1 where the IR receiver LED (on the channel display LED) lights, then adjust it for the centre of this range.

## The Pretty Weightlifter

**Les Lawry-Johns**

I was sitting here minding my own business when a car drew up outside. A pair of pretty legs swung out, and a delightful young lady walked into the shop.

"Will you fix my TV for me?" she asked.

"Of course my dear, what name is it?"

"Wade" she replied. Wade? I'd grown up with these people, known them all my life. As I was writing this down she went back out front and opened the car's boot. I thought it would be a portable. She leaned over, and we saw more of the pretty legs. She then lifted out a 22in. Bush T22A. I've seen substantial men falter when lifting one of these out of a boot. She trotted in however and placed it on the bench.

"How did you manage that?" I asked in awe.

"No trouble" she smiled, "how much will it cost?"

"Not more than fifteen pounds" I said, resisting the temptation to say I'd do it for nothing.

"O.k. then, when shall I call for it?"

"This afternoon, please."

### The T22A's Problem

So off she went. What a swinger! I took the back off and switched on. The power was present but nothing started. After disconnecting the tripler I tried again. Still nothing, but this time I heard the timebase start up and the sound began to hiss. I switched off and checked 5R13 (330 $\Omega$ ), over on the front right side at the bottom, in the tripler's earth connection. It was open-circuit, killed by the tripler. I fitted a replacement and removed the faulty

tripler. In doing so the focus unit broke up. I shouldn't be so rough. With patience I installed a universal tripler, cut the leads to size and fitted a new focus unit. The set now worked well, displaying a good picture.

The young lady returned as promised and paid by cheque. This time I insisted on carrying the set out and putting it in the boot.

"Thank you, it nearly killed me bringing it in" she said.

"Anything for you, but don't do it again" I smiled. I was going to continue but Honey Bunch had by now taken an interest in what was going on and I had to behave myself.

### A Tripping Thorn 8800

The next one in was a Thorn 8800 which really showed how stupid I've become. It was tripping, so I removed the e.h.t. rectifier's lead from the line output transformer. The thing then started up. Being the oaf that I am, I fitted a new e.h.t. unit and tried once more. After a delay the tripping started. Instead of disconnecting the focus unit I concluded that the e.h.t. rectifier I'd fitted was faulty. I fitted another one and this time smoke came from the focus unit then the tripping started again.

Fed up with myself by now I removed the focus unit and saw that there was a dent in its back. I searched high and low for another but couldn't find one – all the stuff is in sacks ready for the move, so I could have missed one. There was nothing for it but to nip along to Geoff's in Sun Lane. He was able to help out but with the new one fitted we still had tripping. To cut a long story short, the faulty focus unit had destroyed the e.h.t. units I'd fitted. I shouted at the cat and pushed her off the bench, then started the search for another e.h.t. unit. At last I found one and, with my fingers crossed, fitted it. Three had been destroyed but this time everything came on o.k. and I breathed a sigh of relief.

Honey Bunch appeared and commented that I always get the easy jobs . . .

### Thanks

I'd like to thank all of you who've written. But don't come down to see me – I'm ashamed of the shop, the way

I've let it go. Unless you want to buy it of course! I'd also like to thank Rick Kinslow for bringing in that bottle of 100 Pipers scotch. H.B. doesn't like it, so I had to drink it all myself. It was lovely and has lifted the depression that's been engulfing me lately, try as I might to throw it off. But I know there are a lot more out there worse off than I, so I mustn't moan.

## Review: Tatung's Early Bird

**Eugene Trundle**

Quite a wide range of satellite TV receiving systems have become available since Astra was launched. Many are aimed at the volume market with prices in the under £300 region. A typical example is the Tatung Early Bird Model TRX1801, which has a suggested retail price of £250-£329 depending on the choice of dish size and LNB rating. I installed one at home and have lived with it for many weeks. We are also deeply involved in selling, installing and servicing these packages and sorting out any problems that arise. Thus this review takes a look at all aspects of the system.

### General Description

A wall-mounted offset aluminium dish finished in white is supplied in either size 60cm or 80cm. The LNBs have HEMPT devices, the noise rating being 1.5 or 1.8dB to order. The receiver has IR remote control, with 19-channel selection from a small, simple handset whose ten keys are duplicated on the receiver's front panel, along with  $\pm$  tuning buttons and a memory key. Station tuning and polarisation data are held in a non-volatile memory which is preprogrammed at the factory to the Astra channels for easy dish installation. A 1½-digit seven-segment red LED display provides channel identification (1-19).

Audio capability is single-channel (6.5MHz), i.e. mono only. The audio and video signals are modulated on to a u.h.f. carrier preset to ch. 38 but tunable over chs. 32-39. There's also a scart output connector providing mono sound in/out, MAC/PAL and baseband outputs. The u.h.f. input socket provides a loop-through facility. Other connections, at the rear, are for the LNB download (F connector) and the polariser supply. The receiver's main electrical characteristics are as follows: input 950-1,750MHz; threshold 6.5dB; power consumption 20W. It's a compact unit, measuring 250mm wide, 170mm deep and 63mm high, with a black plastic case.

### Outdoor Unit

I believe that the dish assembly is one of the best in the budget range. The dish itself is elliptical and is mounted on a very heavy and sturdy wall bracket made of tubular steel. Its tilt and pan actions are positive, making alignment easy. Once these are set the clamping action is strong and rigid with virtually no "twang".

The LNB and feedhorn are mounted on a single, rigid tubular steel arm that sets the focus point without any need for adjustment. The magnetic polariser is incorporated in the feedhorn and is supplied by a separate twin-core cable which takes a constant bidirectional current of about 35mA. Its insertion loss is very low at

around 0.3dB. The combination of this polariser design and the LNB pickup probe gives excellent polar isolation – exceeding 18dB for the Astra channels.

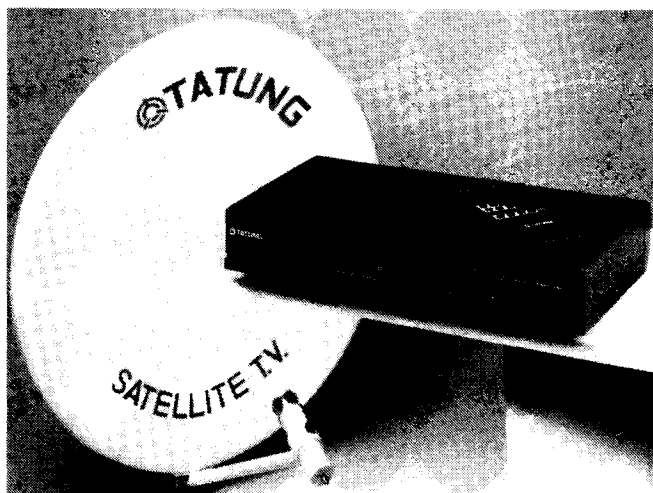
The LNB typically beats its noise rating by up to 0.2dB. Feedhorn and LNB are well protected from the weather and creepy-crawlies. I tried both the 1.5 and 1.8dB noise versions at different times with 60cm dishes and got good results from both at this part of the country within the 52dBW footprint.

All in all the design of the external unit is excellent, both physically and electronically. If properly installed it should be capable of standing up to the worst of the increasingly freakish British weather.

### Indoor Unit

The indoor receiver, which is literally a black box, is capable of giving excellent pictures and passable sound, though in this price range the facilities are necessarily limited. The mono sound is fine so long as you don't intend to hook up to a stereo TV or hi-fi system, but there's no facility for reception of extra carriers (i.e. radio, alternate language or stereo) unless and until scart-linked add-ons become available. I found that the reproduced pictures are very good via either the r.f. or AV links, the exception being some very early production models whose energy-dispersal clamping was not fully effective, giving rise to vertical judder effects with some VCRs and TV sets. There's a modification available for those receivers that left the factory without it being done.

The receiver is easy to program. At the end of each



*The Early Bird package. Several detail changes have been made since this photo was taken: the LNB is now square in cross-section and has a feedhorn; the front panel has ten numerical keys with  $\pm$  tuning and memory buttons; and the handset is smaller and simpler.*

# You Won't Believe This . . .

**Les Lawry-Johns**

We've had a wall built around the rear garden of the bungalow. Not to keep intruders out but to keep the dogs in. The rear garden has also been concreted, again for the dog's use. As repair business at the shop dried up we moved to the bungalow, with the dogs, cat and bird, hoping that the shop will sell before long.

The bungalow is in a secreted part of a housing estate built well after the war on a site previously occupied by Gravesend Airport, which was used by Fighter Command during the war. When an invasion was expected in 1940 all the runways were mined. The public was not informed of course. All these years later the Royal Engineers have been instructed to locate the long tubes of explosives and make them safe. So two days after we arrived we were told that the whole area is to be examined, using metal detectors, and eventually made safe. What a welcome!

Anyway, we've not been blown up yet and the shop telephone number has been transferred to the bungalow.

The other day a man phoned to say that the Decca TV set (80 series chassis) he bought from us some years ago suffered from field collapse after it had been on for about fifteen minutes. He said that hitting the top of the set restored the picture, so I thought it would be a dry-joint. I told him I would be at the shop in ten minutes. When I got there I waited for him to appear. He didn't. So after half an hour I drove to his house. He opened the front door and said "I thought you said ten minutes?"

"I said I'd be at the shop in ten minutes. That way you'd have avoided the call-out charge."

After removing the right-hand side timebase panel I resoldered all the field timebase connections. I then turned the set round and fitted an aerial. There was a good picture when I switched on. It was still there half an hour later.

I replaced the back and suggested a charge of £20. He flinched. "That includes the call-out charge," I explained.

He paid me and I drove off. Before I got very far I was held up by traffic. While waiting I saw the chap I'd just left chasing up the road, so I backed down to meet him.

"It's gone again."

Back to the house again. When we got there the set looked perfectly all right.

"Blast. It's come back again."

"I bet your wife was upset," I said.

"Oh no, this is my set. She's watching hers in the front room."

I took the back off again and watched for another half an hour. It was obvious that the fault was not a dry-joint as I'd assumed. It occurred only when the back was on and the temperature rose. I'd no hairdryer with me to make heat checks on the components and it struck me that this would be best done in the shop. I told him I'd call later to pick the set up.

When I got it to the shop I managed to create the fault by pulling away at the upper left plug and socket on the right side timebase panel. So I took the panel out and resoldered all the connections. There was a clear picture when I switched on again. After refitting the back I let the set run for an hour or so. Then, confident that all was well, I put it into the estate car carefully and returned it to Mr. Evans.

I was similarly gentle with the set when I got to his house. I plugged it in and connected the aerial. There was a white line until I clouted the top of the set and a picture appeared. This was too much. I returned the £20 and apologised. In fact I practically ran out of the house. But I've an idea that the set will be all right after this.

## **The Midday Clinic**

When I got back to the bungalow the phone was ringing. A G11 I'd repaired several weeks ago had gone wrong. I asked the owner to bring it to the shop at about twelve the following day. Shortly afterwards a lady rang to say that her ITT portable had a funny fault – the sound would go off until the aerial plug was waggled about. I asked her to bring the set to the shop midday tomorrow.

So just before midday I packed my stuff into the car and sped off down to the shop. The G11 was the first one to arrive. The holder at the back didn't hold a remote control unit. I switched on and a red light appeared. Nothing happened when I pressed the button, and switching off and on again made no difference. There was life on the power supply panel, but only 50V at the fuse. I checked here, there and everywhere but couldn't get the h.t. to rise. The reservoir capacitor was of the blue welded type. I'd fitted it some time ago and it checked o.k. After spending some time checking through the power supply circuit I'd got no further and gave up. Another failure.

Shortly after the ITT portable arrived. I removed the cover and found that the sound came on and went off as the coaxial aerial lead was juggled about over the tuner and i.f. unit. No dry-joints could be seen when the chassis was taken out, but I did find that when the tuner etc. was held in one position the sound didn't go off. So I fitted a wedge. I showed the lady what I'd done and explained that in my opinion the fault was in the tuner-i.f. unit, but that I didn't have a replacement. She seemed happy enough and left me a pound for my trouble. I know that I should have removed the unit and stripped it down, but I didn't have the patience. Sorry.

## **Another G11**

Another call had come in while I'd been away. A G11 with field collapse. When I arrived at the house I found that the owner was the best friend of an old friend of mine, so I resolved not to give up this time.

After removing the rear cover I checked that voltage was present at the TDA2600 field output chip. I then fitted a new TDA2600, with the clip under it, and refitted the heatsink. The line was still there. I told the owner I wouldn't be long and sped off to the shop, hoping to find another panel. As luck would have it I'd kept an old G11 with a duff tube. After extracting the upper left panel I hurried back to the house and fitted it. I crossed my fingers and switched on. The picture appeared and I was greatly relieved.

I felt guilty about charging them £25, but they seemed to be quite happy and I went off with the faulty panel. I'll find the fault on it when I have time. Meanwhile all the best to you all.

bandwidth despite the effects of shunt capacitance which, as we've just seen, produces a cut-off at 1.4MHz. To offset the effect of the capacitance, the  $LR$  circuit must similarly have a "cut-off" at 1.4MHz and the inductive time-constant must be equal to the capacitive time-constant, i.e.  $0.12\mu\text{sec}$ . Now the time-constant of an inductive circuit is given by  $L/R$ . Thus the inductance required is  $L = tR = 0.12 \times 10^{-6} \times 4 \times 10^3 \text{H} = 480\mu\text{H}$ .

If this value was used in our video amplifier the results obtained would be disappointing – a check on the frequency response would show it to be far from level over the passband. This is because two important factors have been overlooked. The first is that we've not allowed for resonance. Since the inductance and the capacitance form a tuned circuit, by making both time-constants  $0.12\text{sec}$  we've ensured that the resonant frequency is 1.4MHz – right in the middle of the video bandwidth. True, the  $4\text{k}\Omega$  load resistor in series with the inductor provides a high degree of damping, but the response curve will nevertheless have a significant hump centred at 1.4MHz.

To keep the boost to an acceptable level and ensure a reasonably level response the value of the inductance should be significantly less than the value worked out above. The mathematical concept of maximal flatness gives some idea of the inductance value to use. A maximally flat curve is one without maxima and minima.

falling away from the ideal level response very gently as the frequency rises. This response can be obtained by using an inductance with a value of  $0.41$  of that previously calculated, i.e.  $196\mu\text{H}$ .

The second factor overlooked so far is that with an amplifier designed to handle pulse-type signals the shape of the frequency-response curve is not the best criterion of performance. Phase response also matters, and to secure a good response with pulse signals it's useful to aim at securing a maximally-flat group-delay/frequency curve. This is attained by using an inductance value  $0.32$  times that initially calculated, i.e.  $154\mu\text{H}$ . So an inductance value between  $154$ – $196\mu\text{H}$  would be suitable, suggesting a value of around  $175\mu\text{H}$ . If inductive compensation is to be used a medium-wave tuning inductor could, if available, be used, saving a lot of work.

This final example of inductance calculation has led us into the further subjects of resonance and maximal flatness. It was worth including in order to illustrate the problems that inductors can introduce. The capacitive examples were straightforward and illustrated the simple method of calculating the component values required to obtain the desired response. The shape of the curve can be sketched once the cut-off frequency is known, the only figures required being the 3dB point (gain or loss at cut-off) and the 1dB gain or loss an octave away.

## *A Day in the Life of . . .*

**Les Lawry-Johns**

I'd been at the shop on the previous day and decided to pay another visit after lunch to make sure that everything was all right and to attend to any customers. As there weren't many I thought I'd pop into the Coach and Horses next door to have a word with the landlord Dave. Perhaps he might know about the surveyor who'd called at the shop yesterday? I knew that he was looking it over on behalf of a building society, but didn't know who had initiated the interest. Dave's son had been looking around lately, and I felt he might know something. He didn't, so I sat back and started on my half of bitter, which is all I drink when driving.

A magician friend of mine sat nearby, with his daughter and her husband. I showed them the August issue which contained those lovely letters about my retirement. I've said thanks before for all your good wishes, but must do so again. I really didn't know you cared so much.

After finishing our drinks we went our various ways. Shortly after I'd returned to the shop Bob appeared. He looks after the radio bits and pieces at the local hospital and entertains the patients with music etc. With him was the hospital's ITT TV set which had given up the ghost. He plonked it on the bench and after removing the rear cover I switched it on. Apart from the degaussing buzz there was no response. It was an ex-rental set and I'd not seen one like it before, so I can't tell you the model number.

H.T. was present at the collector of the line output transistor, and when I went on to check the components in its base circuit the set started up. So I switched off and checked carefully for dry-joints. There were a few around the coil in the base circuit. After resoldering these and some more in the vicinity the set started up each time I

switched on. I replaced the back and asked Bob for a couple of quid. He insisted on making it a fiver. So I wrote him out a bill and he carted the set off happily. That was about all the servicing required. A few friends popped in to pass the time of day, and shortly afterwards I locked up and drove back to the bungalow.

That was yesterday. I was up early this morning. Slide out of bed and step carefully over the dogs. Then start to dress, making a point of pulling my socks on whilst standing up. I'm determined to keep this up because when I have to sit down to do it I'll know I'm really getting old. Dressing complete, I walked up the road to collect the morning paper. We don't have it delivered to ensure that I keep active first thing. Back for breakfast and to feed the cat who won't live in the house but spends her time out on the roof of the shed. I hope she'll change her mind about this when winter comes. Spock's over sixteen now and won't last much longer.

After H.B. had departed on her morning's run around I looked out and saw someone familiar coming towards the front door. It couldn't be, but it was. Stan from SEME. He looked over the bungalow and the dogs didn't bark once. They know him well. After a few pleasantries Stan departed, without an order. H.B. returned shortly after and announced that one of her daughters wanted a remote control unit for her Philips TV set. So having seen Stan off I had to phone SEME for the unit.

Later another of H.B.'s daughters called, bringing with her an Alba PTV10 portable radio/TV set. I couldn't get a reading across the mains input, so I checked the transformer. It said there was a thermal fuse in series with the winding but I couldn't find it. In fact I destroyed the winding while trying to do so. Another order to make.

bound in improved hard-cover form. For a colour leaflet listing the models included and price, apply to U-View, 29 Warmsworth Road, Doncaster, Yorkshire DN4 0RP (telephone 0302 855 017).

### **HINARI's NEW CHAIRMAN**

Brian Palmer, who established Hinari Consumer Electronics in 1985, has resigned as chairman and chief executive. He is handing over to John Robinson who is ex-managing director of Electrocomponents. Hinari grew rapidly from a turnover of £10m in 1985-86 to £65m in 1988-89. It evolved from the wholesale distributor Trical, which Brian Palmer also started. It seems that he

prefers the challenge of the new to running an established firm.

### **RUMBELOWS – A CORRECTION**

We must apologise for a most unfortunate error in our news item last month on the Rumbelows reorganisation. Our suggestion, due to a misinterpretation, that the servicing side will be contracted out to other companies is quite wrong. What we should have said was that servicing work carried out for other companies will be gradually reduced. Solutions has ceased to trade, the servicing side becoming an integral part of Rumbelows' customer offer, organised on a local, regional basis.

# **What Next?**

*Les Lawry-Johns*

Still more letters and cards have arrived! My thanks to you all. Because of my muddled head I can't write like I could just a few years ago, but I can manage to repair a few TV sets that people phone up about. Unfortunately it seems to take me a lot longer to do these sets than it did just a short time back, but I still try.

### **The Philips G11**

Take the Philips G11 that someone phoned up about recently. I've repaired more of these sets than any other type. He asked me to call at his house to have a look at it. I did and couldn't find a thing wrong. He said it suffered from field collapse every day or so. The only thing to do was to cart it off down to the shop to have a closer look. When it was on the bench I couldn't induce field collapse however much I tapped around, but every now and then the picture went red then failed completely. This was soon traced to a poorly fitting plug on the video panel. I thought I'd leave the set on for a while to see what happened. While waiting I popped into Dave's Coach and Horses next door, leaving a note to tell prospective customers where they could find me. Just half a bitter, because more than that makes my mind even more cloudy and I had to drive quite a way. The set was still all right when I got back, so I resoldered every joint around the TDA2600 field timebase chip, its supply, etc., after which I kept an eye on it for another hour or so. Then I carted it back to its owner and asked him to let me know if it misbehaved again.

Next day he phoned to say that it was doing something different. Every now and again the field varied and curved. So I drove off for a further inspection. As the height was varying I thought I'd have another go at finding a dry-joint. The upshot of this was no field scan at all. After checking that the supplies to the field timebase were present I fitted a new TDA2600. With the heatsink back on everything seemed to be o.k. I watched for several minutes, then checked the video plug and socket again. After that I left. I've not heard further, so I must conclude either that the set's now all right or that the owner is fed up and has bought a new one.

Back to the shop to meet a couple who are thinking of buying it and using it as a hairdressers. I showed them over the place but they didn't show any signs of

eagerness to buy. I suppose I'll just have to wait until the Indian solicitors down the road have made up their minds, which they've been trying to do for several months without actually showing their hand . . .

### **Another Philips Set**

As I was about to leave a chap came in with this 20in. Philips colour set – Model 20/CT4636/05T (KT4 chassis). It wasn't necessary to let down the main panel because I could see that the trouble was over on the right-hand side: the line output transformer had an obviously poor contact, which I carefully resoldered along with the connections to several of the other pins, just to be sure. This seems to be a common fault condition that affects many models nowadays. The transformer does lead a busy life of course. I wrapped the set up and tried it once more, for the young fellow's sake. He then departed in high spirits, having had to pay me only a fiver.

After this I locked up and returned to the bungalow to see how Gunga Din was coping – our new dog, a pal for Zeb and Tessa. As usual he started a scrap with Zeb as soon as I reached the gate – he seems to be possessive and wants to show Zeb that I'm his. Tessa has to come between them to stop any real damage being done. She does this with amazing ability and they don't argue with her – she's the boss! Incidentally Spock (the cat) still hasn't come in. She sleeps outside, coming up on the shed when she wants to be fed.

Later I had to return to the shop to show it to another chap, a second-hand furniture dealer who is looking for premises in the town or just outside it. He was impressed with the place (heaven knows why) and said he would contact me later if he could raise the cash.

### **Loss of Picture**

While I was dealing with him someone else brought in a portable TV set with the complaint that the picture failed every time the aerial plug was touched. Memories of that other portable flooded back – the one with just the same symptoms, caused by the aerial cable disturbing the tuner unit. This time however nothing went wrong when I fitted my own aerial. He'd brought with him his short piece of aerial cable. I checked this and then fitted new plugs. This done there was no further disturbance no matter how much the aerial plug was waggled about. I charged him a couple of quid and he left quite pleased.

Back at the bungalow I wondered whether the shop would soon be a hairdressers, a second-hand furniture emporium or a solicitors' office . . .

was plunged into gloom.

Ralph Topcut, who had been demonstrating a compact disc player in the shop, scurried through and began complaining. Norman grabbed his tools, Gareth some fuses and a card of fusewire, while Andy found a torch.

They dashed around making a great commotion. In the midst of all this Sid yawned, picked up his jacket and strolled out through the yard to the Belvedere Cafe, his usual lunching place. The toaster could wait till this afternoon.

## *A Bout of Despair*

**Les Lawry-Johns**

When an old friend carried in his almost new colour portable I thought it was going to be a five minute job. I started by assuming that it was a Fidelity receiver hiding behind another name (Goodmans), but though I looked here, there and everywhere I couldn't find the correct circuit diagram. It seemed to be similar to the ZX3000 chassis, but the layout was different. The line output transformer was at the rear centre. It looked like the one in the earlier Fidelity ranges, with the integrated focus and first anode supply knobs sticking out. The chopper transistor and its control chip were where you'd expect them, on the left side viewed from the rear, but the chip was a TDA4601 instead of a TDA4600. I checked the legs, and they seemed to have the same layout. Anyway, as the set wasn't working I fitted a TDA4600 and checked the voltages, which all seemed to be low.

Perhaps there was an overload? I checked the line output transformer etc. carefully and got nowhere. In fact I spent a whole week on it, checking this, that and the other. When I say a whole week what I mean is that during the course of a week I spent several hours on it without achieving anything. I don't spend all that much time in the shop nowadays – I suppose I'm getting lazy in my old age. Finally I decided to let someone with a more active mind have a go. So I carted the set off to Geoff in Sun Lane. He kept it a week and then asked me to collect it before it drove him barmy. He'd thought it was the line output transformer loading down the supply, and I'd run one up to him just in case I'd made a mistake earlier. As it was my last one I ordered another from SEME Stan, along with some other items I might require. Geoff didn't need the transformer however as the replacement didn't make any difference. So out it came and back went the original. He also checked the field output stage, in case an overload there was shutting everything down.

What was I to do when it came back? I assumed that there was a problem with the start-up system, and ordered a TDA4601 just in case. This didn't make any difference either, so I got down to checking every component in the chip's supply circuit, taking each item out in turn to be sure. In due course I came to a 100 $\mu$ F, 25V electrolytic which acts as the reservoir capacitor for the start-up and also the running supply to the chip – it's connected to pin 9. I checked it carefully and it claimed to be in order. Substitution seemed to be a sensible double-check however, and when a replacement had been fitted normal results were restored.

At this I went into seventh heaven. I can't tell you the hours I'd spent checking various possible culprits, as well as phoning up everyone I thought might be able to help. I feel ashamed at troubling so many people, but there

you are – all because of an electrolytic that tested o.k. The start-up feed comes via a 15k $\Omega$  resistor, and I noticed that one end of this is very close to the h.t. fuse. Maybe the electrolytic had been disturbed by a nasty shock at some time. If all this sounds trivial to you, just wait until you get something like it!

Things have been much as usual here apart from that wicked set. The shop still hasn't sold, the cat still won't come in, the two male dogs still can't agree not to fight, the weather seems to be getting colder and H.B. has decided to sell our car which I've just taxed and reinsured. She's going to sell it to her sister's husband who is not having much luck with his car at the moment. Our Renault 18 has been very reliable and just as it's in sparkling form she's going to pass it on. Apparently we are going to get a smaller car, a Renault 5 or something like that. I don't seem to have too much say in our business lately.

### *The Lady with the CVC5*

As I was jotting that down the phone went and a sexy sounding lady asked me to call and look at her set which had gone on the blink. It turned out to be an ITT CVC5 that had been left on with a faulty tripler. This hadn't done the line output stage much good of course. A new tripler and a PL509 line output valve restored fairly good results, but I replaced the PY500 efficiency diode as well in case it had suffered. What about payment? It seemed that the lady had other ideas. Other than cash, that is. But I didn't fall for it and asked for my money. I told her I was sixty six and couldn't even if I wanted to. After a small argument she paid up and I departed in haste.

### *A Waltham Portable*

An old customer phoned to say that he wanted to bring a Waltham portable along to the shop. I got there just in time and when I put the set on the bench I found that there was a small, dark picture, with pulling all over the place. I thought it would be the reservoir capacitor, but bridging this with a 4,700 $\mu$ F test capacitor made no difference. I then looked carefully for a cracked track as I'd had this trouble with the panel before. All relevant tracks showed continuity however. So I dabbed around with the 4,700 $\mu$ F capacitor to see whether I could find a point where it did any good. At one point the picture cleared up wonderfully, though there was still a slight gap at either side of the raster. I couldn't see exactly where this point was – it was not far from the bridge rectifier. As I wasn't prepared to argue about it I left the set on soak test for a while. I then ran it back to its owner and showed him it working with a good picture. He paid his fiver (he's an old man) and I departed for the bungalow.

I'm getting worried about having this bungalow since the bridging loan is costing me plenty and the shop just doesn't seem to attract any serious buyers. I feel sure that something will happen soon however. Is anyone out there interested?

fitted on the metal plate above VT21. The printed circuit was cut to accommodate the 0.22Ω current sensing resistor. Unfortunately, due to the physical layout the potentiometer chain couldn't be connected to the output side of this resistor. The following components were removed: R100, R101, R102, C83, C86, C87, W17 and VT22. R103 was changed to 680Ω, R104 to 270Ω and R106 to 120Ω.

*K.J. Treeby,  
Plymouth, Devon.*

### STOLEN

Several items were stolen from my car whilst I was staying overnight in Telford on a business trip. These are as follows: An Avo Model 8 in a brown leather carrying case, the probes well worn and repaired with insulating tape; two tool cases, one holding a soldering iron plus a plastic/green cloth tool roll containing various servicing tools, the other case containing tools for the car; and a red plastic spares box of the type with trays that fold out when the lid is opened, containing various electronic spare parts. I would be most grateful for any information leading to the recovery of these items, and would be prepared to offer a reward.

*J. E. Bagley, Whitehall, Bewdley Bank,  
Canon Pyon Road, Herts. HR4 7SH.*

### CAR RADIO-CASSETTE PLAYERS

I service car radio-cassette players and frequently find that the connections to the tape head have broken. The cause is usually broken cores in the lead, or the lead

breaking away from the terminals on the head. Many manufacturers use very stiff screened cable, often poorly anchored. For many years I've overcome this problem by using record player pickup arm lead – the five-core, very fine flexible cable that's used to connect the cartridge to the sockets under the deck. The lack of screening hasn't caused any problems, in fact many manufacturers have started to use unscreened cable. But it tends to be rather heavy, not very flexible and it still breaks!

The problem is that I have to pay £2.40 for a 15 in. length of the pickup lead, and the source of supply will eventually dry up. I've tried to obtain this type of lead elsewhere, so far without success. Does anyone know of a source of supply, preferably by the metre? Perhaps some enterprising supplier could persuade a cable manufacturer to make some?

*Geoff Davies,  
Rugby, Warwickshire.*

### WANTED

I would like to thank those readers who have written in with details of playing NTSC tapes on UK VCRs. I'd like to obtain an 8928/JVC HR3330TR, but have so far failed to locate one. Does any dealer or individual have one for sale? If so, please write stating the condition and price (please don't send the machine until a sale has been agreed!).

If any other reader wants one, I'd be happy to keep a "want list" and pass on any offers received.

*John de Rivas, West Towan House,  
Porthtowan, Truro, Cornwall TR4 8AX.*

## Video Trouble

**Les Lawry-Johns**

A belt in our Fidelity VCR broke – I'm told it's a Fisher-Sanyo machine. Now I've never repaired a video recorder in my life and don't stock the belts, so I ran down to Geoff's place in Sun Lane. He fitted a new belt and tested the machine. I took it back home and it worked all right for a week or so. Then severe hum bars started to show and you couldn't watch the picture. Back it went to Geoff who kept it for a week or so because it wouldn't record the sound.

Eddy who works for Geoff had replaced some rectifiers to cure the hum bars but didn't seem to want to spend time on the loss of sound recording. Something in the i.f. panel he said. I took it home for Honey Bunch to play with. She was able to use it to play our recorded tapes but wasn't pleased about the sound recording problem and kept on at me to have a go. If Eddy couldn't find the cause of the problem, what hope had I? After some days she visited one of her daughters and came back with an elderly Sony Betamax machine. This frightened the life out of me but, with HB's son-in-law, we managed to get it going and it performs quite well. We have to have a machine so that HB's grandson can watch "Home and Away" and "Neighbours" after we've collected him from school in the afternoon.

I feel guilty about this lack of adventurousness but don't like to risk mucking things up. I still tackle TV sets

of course but the call for repairs is not great nowadays, as you probably know. There are quite a lot of Ferguson portables around with dry-joints causing intermittent field collapse however.

Then there was this chap who brought in a TX10. Said it kept cutting out. He left it and I immediately checked the focus/e.h.t. unit on the right-hand side when viewed from the rear. As it was blackened I disconnected the bottom screws and hung it free as a check – I was down at the shop, and my new focus/e.h.t. units were back at the bungalow, so I had to check as best as I could. The set worked all right, showing a faded BBC-2 picture. Then suddenly there was a flashover in the faulty unit and the h.t. fuse failed. The chopper transistor had shorted, so I had to fit a new BU208A. After doing this I popped back to the bungalow for a focus/e.h.t. unit – the modified type.

When this was fitted the picture was reliable but was faint and lacked green content. I turned up the green at the c.r.t. base but the tube was obviously low. So I took the chassis out, turned it up and shorted out the resistor that's in series with the c.r.t. heaters. The heaters then glowed a bit brighter and the picture slowly improved: after a while the greens returned.

When the owner returned I showed him the picture and told him that it would improve with use. There was a problem with the remote control system, which would give only even-numbered channel selection. I couldn't find anything obviously wrong with the cables and contacts and, as the owner didn't seem to be too concerned about this, I wrapped the set up. Perhaps someone familiar with these sets would like to comment on this symptom?



microamp." Sid bent over the Cathode Cruncher. "Does seem pretty lifeless" he agreed, but I can't believe the tube is all that flat. Maybe something's wrong with the booster."

Andy, rain soaked and breathing hard, muttering imprecations about heathen hill farms, backed through the double doors and dumped the abused TV on the floor. "They'll have a new set up at Pickersgill Craggs" he told Sid. "Send them one with a wide mains input range – that generator has a will of its own!"

"Only because Arthur Longbottom insists on fiddling with it" Sid replied. "But we could do with the sale. I'll take one up later." Meanwhile he took the covers off the booster. Overheated resistors and a disintegrated capacitor greeted him. "Even the perishin' test gear needs repair in this dump" he moaned, then went on to disembowel the booster with gusto.

Norman left him to it and, while Andy turned his attention to a record turntable with a linear tracking system fault, took a look at a Ferguson SRA1 satellite TV receiver that had come in because of random remote control operation. The customer's complaint was that it had switched itself off once, gone into standby several times, and had changed channel on a couple of occasions. Not unusual with TV sets, but satellite TV receivers were still something of an unknown quantity in the workshop.

Norman took off the covers and snapped on the bench lamp. After an hour on the bench nothing had happened. "I might as well link it up and watch something" he muttered. He fetched a spare TV set from the soak bench and connected it to the SRA1, then plugged in the lead from the dish on the roof. Things soon began to happen, just as the customer said. By luck the unit sent itself into the sound mute condition. During the sudden silence a slight sizzling noise could be heard. Norman doused the bench lights to look for telltale sparks. Sure enough there were some on the underside of the board, near the IR receiver. He disconnected the unit from the mains and investigated.

The SRA1 has a three-cored mains lead and is thus earthed. The PCB is earthed to the metal case at only one point, near the IR receiver. This point was making poor contact. The arcing was due to the non-isolated aerial socket used with the TV set's isolated chassis allowing line-frequency currents to flow in sufficient quantity to cause a small spark at the indifferent earth connection. Norman felt pleased with himself.

Andy's problem turned out to be caused by a defective motor. Shortly afterwards Mr. Knowles was on the phone to thank them for their trouble and to say that the picture was splendid.

"Makes you wonder what some peoples' eyesight is like" was all that Norman could say.

## What will 1990 Bring?

*Les Lawry-Johns*

Not a lot, I suppose. But at least we're still here. So many seem to have popped off recently. It makes you feel you're cheating by keeping going, but I suppose that there's still room for us even if we have to do without some of the things we'd become used to. As I sit here I'm crowded in by three dogs and a bird: dogs on the left, bird on the right. I don't know which is worse. The dogs keep quarrelling (quietly though) while the bird runs around her cage as though there's someone after her. Honey Bunch has gone out to do some shopping and, no doubt, gossiping. I mustn't say too much, because she'll read this before I send it in. But, good lord, don't I gossip as well?

There's not a lot to tell you about sets. That Fidelity VCR is still playing up. First there was no sound, now it buckles the tapes. However, we've still got the Sony Betamax machine, though the heads have needed cleaning several times – after a certain tape has been played I think. I clean the heads with my finger sprayed with Aero-Clene. A lazy man's way of doing it no doubt, but it seems to work. Sorry about that . . .

Some TV sets have been attended to, and that seems to be about all I've been capable of recently. A shorted diode in a Ferguson portable had blown the mains fuse, and there was a far eastern set with a faulty line output transformer. I couldn't do this one because I didn't have the transformer to fit in it. Anyway, it was only a few months old so still under guarantee.

The owner's complaint about an ITT set was that the aerial socket needed fixing because the picture and sound kept failing. I repaired the socket but the signals

kept going because, as I found out after a while, of a dry-joint at the base of the tuner unit. It didn't look as though it was dry, but it responded to tapping. So I scraped it clean and resoldered it carefully. The signals didn't go off after that.

You may wonder how I can do these jobs. It's because the shop still hasn't been sold. It went into auction the other day, but hardly a sale was made (few reached the required price, including mine). So I suppose I'll have to keep hoping that someone will come along to clear my enormous bank overdraft. I've had offers, but they wouldn't clear my debt to the bank. When I look round at the dogs, cat and bird I wonder if they know more than us. They seem to get along without all the worry and trouble we've made for ourselves. We have to be clever and keep on inventing things like TV sets and so on. Where do we end up? Up to our ears in debt, that's where . . .

I've recently had a couple of jobs from the same house. One was a Grundig set that I had to cart off to the shop. There was reduced field scan at the bottom of the raster, but when I got the set on the bench nothing seemed to be wrong. I stripped it down and resoldered everything to do with the field output stage. After that I couldn't make the set do anything wrong however much I probed around. So in the end I took it back and explained the situation to its owners.

They asked me to look at another set of theirs, upstairs. Up I went to look at a dead HMV receiver, one fitted with the Thorn 9500 chassis. The mains input was o.k., so I went along the back to the red button cutout. This was open-circuit and I just happened to have a spare one in my case. After fitting it the set came on all right. I charged them £15 for the trouble and they paid up happily. I've been expecting them on the phone ever since about the Grundig receiver, but I've not heard so far. Maybe the soldering has been successful.

Well that's all for now. My best wishes to you all for 1990.

Sony has launched its first S-VHS VCR in Japan. Model SLV-R7 is priced at the equivalent of £800 and a European launch is expected later this year. Features include an on-screen display and a digital timebase corrector (TBC) to reduce jitter. Sony's CCDF380 8mm camcorder has been released in the UK with a suggested price of £799. A key feature is the auto-lock panel that covers the less used facilities and puts the camcorder in the automatic mode. This offers pick up, point and shoot filming. The CCDF380 weighs 1.2kg.

Hitachi has launched the Lapwatch Model VTLC50 in the UK at a suggested price of £1,300. It combines a VHS VCR with a 5in. TV set with LCD screen and has PAL/SECAM capability – it will also play NTSC tapes.

### IN BRIEF

If you hurry you've just time to attend The Video Show, which is being held on March 23rd-25th at the Westminster Exhibition Centre (Horticultural Halls), Vincent Square, London SW1. This consumer video show is organised by *What Video* and *Camcorder User* magazines. The first morning is a free trade preview, public admission being from 12 noon.

The Vintage Wireless Company Ltd., Tudor House, Cossham Street, Mangotsfield, Bristol BS17 3EN has published a new "wanted list" for 1990. It's a 28-page listing of stock required for resale. The Saturday retail showroom has been reopened – callers are welcome from 10 a.m. to 3 p.m.

## Things Ain't So Good

Les Lawry-Johns

They're certainly not. The shop still hasn't sold and not many jobs are coming in. Those that do take me ten times longer to sort out than they used to do.

Take the set I collected the other day. I'd looked at it before but it had refused to go wrong. I was then told that the bottom of the picture came up after several hours. To about half way. I took it down to the shop and spent several hours trying to find the cause of this. It appeared to be a TX90, but there were some differences in the field output stage. Eventually I changed the transistors and diodes. The diodes shorted and I found an open-circuit resistor in the feed to the output stage. Its value appeared to be 12Ω, but when I fitted a replacement of this value the diodes again shorted. The lower transistor also appeared to have been damaged. So in went more components, including a 22Ω resistor this time. The field scan now opened up, but with bottom compression. This was overcome by altering the value of a couple of resistors – there's no linearity control. If all this puzzles you, the name on the front was Logic instead of Ferguson. The main panel was mounted flat in the middle, not upended on the left-hand side as with Ferguson sets.

Someone then phoned to say that his GEC colour receiver was smelling. I thought that this might be due to the tripler, so I asked him to bring it down to the shop. When the set arrived I switched it on and the smell came up. On sniffing around I found that its source was the upper left-side mains fuse. You could see that its black cover had been melting. So I unplugged the set and

removed the cover of the fuse. The fuse came out as well of course. It was blackened and had obviously been damaged by poor contact. The fuseholder was cleaned and the contacts tightened, then a new fuse was fitted. It no longer smelt and the job was finished. I told the owner that he wouldn't get the smell again and he departed in high spirits.

I was subsequently asked to repair a Grundig set and agreed to have a look as I knew the owner. He brought it in and told me that there was no sound or picture at all. So I removed the rear cover and started to check the line output stage etc. As this appeared to be in order I spent some time checking around the tuner. Nothing seemed to be wrong so I turned to the front of the set and twiddled the control knobs. The screen lit up, with dots, and the sound hissed. I tuned the buttons down to our transmitter and got a faint picture with sound. The results were the same when the aerial was disconnected. An examination of the aerial socket showed that it had seen better times. When a new one was fitted the picture looked as good as new and the sound was perfect. I launched into a fever of abuse but the owner maintained that the screen hadn't lit up and that there had been nothing at all from the speaker. Oh well, we can't all be perfect, can we?!

A Philips G11 I was called to did funny things after a few minutes. So I took it down to the shop where I had it working on the bench for a couple of hours. As it wouldn't do anything wrong I had to take it back to the owner. She phoned later to say the fault had reappeared, so I had to repeat the procedure.

This time it did do funny things when I had it on the bench. After about an hour the bottom of the picture came up, with a white line indicating compression – about half way up, actually. I tapped around the field output stage gently, and this immediately restored full scan. So I had to wait for the fault to put in another appearance – it couldn't be made to occur by disturbance. Eventually the bottom came up again and this time I was gentler, disturbing things with my fingers. It was only when I gently rocked the TDA2600 field output chip's heatsink that the fault cleared. So out it came and the socket was thoroughly cleaned and sprayed. Then back went the chip, the clip and the heatsink. I gather that the fault hasn't occurred since.

The same owner then brought a Philips KT3 along. She said that it had been working well until one day when it had started to click at switch on. I removed the rear cover and disconnected the tripler from the line output transformer. The sound then came on and there was plenty of life from the transformer. Assuming that the tripler was responsible for the trouble, I removed it and fitted my last one. You can imagine my annoyance when the set tripped just as it had done previously. I had checked for discharge from the e.h.t. cap and there hadn't seemed to be any. Nevertheless I removed the cap and carefully cleaned the area around it. The set then came on and didn't click. I cursed myself for being too quick to accuse the tripler. How can I carry on when I'm so stupid?

That's the problem you see. Something wrong with my head. Probably what should have happened twenty years hence. It started about three years ago. When I went to the doctor about it he said he thought it might be my heart. It wasn't, so I can only assume it's something to do with ageing. The trouble is that it's getting worse as time goes by. What with that and the shop, things are bad.

great care must be taken.

When you are sure that your checks confirm that the unit will run, replace TP01 and DP21, fit TP37 and switch on. If you have a variac you can be more prudent, using it to set the mains input at 110V before you try the unit. If the power supply works under these conditions,

set the 12V rail correctly (monitor at test point BP08) by adjusting PP57 *slowly*. Then raise the mains input to 240V and check that the 12V setting is maintained. If you've been thorough the power supply should work normally and the machine can be returned to its owner. If you haven't – go back to square one and try again!

# The House Husband

Les Lawry-Johns

Well here I am, still trying to get used to retirement: confined to the bungalow and wondering what to do after I've done some of the jobs a housewife does. I never realised how hard they work and the different things they have to do. H.B. goes out most mornings to earn a few bob and I'm left to my own devices. I suppose I'll get used to it but I don't know when. The shop hasn't sold yet and I don't suppose it will for a while. If things don't change I might even rent it out to someone. At least that would help me pay the bank a little of what I owe it. I still get a few jobs, some of which might interest you.

For example the Philips G11 set I had to pick up the other day. There was only a vertical white line in the centre of the screen. This told me that the line timebase was working but the line scan coils weren't being driven. On inspection I found that the scan coupling capacitor C3135 (0.91 $\mu$ F) had bulged out. When it was removed and checked it proved to be open-circuit. I found a replacement of the same value and rating but of more rectangular shape and fitted it, ensuring that it didn't touch any nearby components. When the set was switched on again there was a full raster but no vision or sound. I had to tune in all the stations as the owner had probably tried retuning in an effort at clearing the white line. It was then soak tested for a while before being returned to the owner who was pleased that it had been done so quickly – and cheaply (I can't bring myself to charge the current rates).

The next set I had to visit was a Bush one fitted with the Rank T20 chassis. This had no visible picture. The e.h.t. was o.k. so I took the coward's way out and increased the first anode voltages. This produced a picture but I'd forgotten the brightness network, so I couldn't do the job properly. The customer seemed to be quite happy however so I left him with it. I know a resistor had gone high in value but I didn't have the circuit with me. I may go back and do the job properly one day: when he calls me again for something else.

Then there was the Philips K30 with a scrambled picture and poor sound. I'd repaired the set some time ago – removing the aerial socket and repairing it. I thought that the present trouble would be a repeat performance but when a screwdriver was placed in the socket a much better picture was resolved. So I checked the cable from the VCR and then connected the main aerial cable to the set directly. The picture was still scrambled and as the plug and cable were o.k. I had to refer the owner to an aerial rigger. I used to put up aerial cable to the set directly. The picture was still

The jobs are not all that many, which is why I'm not writing so much. It's mainly a question of doing things like peeling the potatoes, which I'm doing while H.B. is out teaching her daughter to drive. Nobody did that for me. I had to teach myself on an airfield in Egypt. The

second time I drove the lorry a Chief Petty Officer hailed me down and asked for a lift. As I was driving he commented "you blokes amaze me the way you can handle these vehicles". I didn't like to tell him I couldn't drive and wasn't licenced. A few nights later I was in charge of the night guard and had to post several men around the airfield. It was coming up for midnight so I popped over to the marine section and borrowed one of their lorries. While I was driving it around the hangers the port side wheels slipped into a hollow and the whole thing turned over. Luckily no one was hurt but we were unable to turn it back up. I waited till the next morning before reporting it and was subsequently charged and brought up before the C.O. As the officers from my squadron appeared on my behalf I got off lightly. A month's stoppage of leave I think, which didn't mean much being stuck out there. It's funny that I can remember such things that occurred fifty years ago but can't remember what happened yesterday.

But I can remember popping down to the shop when who should turn up but Beardy and Nonbeardy. This surprised me after the dust up we'd had on the previous occasion. They carted in a Philips K30 and said that it went off a few moments after it was switched on. When I switched it on I could hear the sparking. After removing the back cover I saw the arcing around the e.h.t. cap. I switched off and to my surprise the cap wasn't even clipped on. So I cleaned the area around the top of the tube and sprayed it with antistatic solution, then looked at the cap which was in a sorry state. I had to clip it off and look for another one, then peel the insulation back to prevent further discharge. Having done this it was just a matter of soldering the leads and pulling back the covering. When I clipped on the cap and switched the set on it came to life and stayed that way. After refitting the rear cover it was time to face the intrigued two.

"That's that" I said.

"Is that all it was?" said Beardy. "We don't have to pay for a little thing like that, do we?"

"Oh yes you do, and the next time you can try to do it yourself" I commented, wondering whether they would remember to discharge the e.h.t. cap to earth as I had done if they did try. After a struggle I managed to get £15 out of them before they left, vowing never to return to such a pricey establishment.

When I got back to the bungalow Stan from SEME called, not to take an order but to see if I was still alive and to see H.B. He left me the latest SEME catalogue which is full of interesting things. After he'd gone H.B. started on me.

"That cassette in the car is mucking about all over the place."

I'd fitted it only the week before and it was brand new. So that's another job I've got to do. I suppose I may get around to doing it one of these years . . .

# Triple Trouble

**Les Lawry-Johns**

I got up and stood to get dressed, as I've always done though some of you don't believe it. You see it's always best to do things the hard way, then when things get really hard it doesn't seem too bad.

## **The Grundig that went Bang**

When I'd done the cleaning etc. I went out to pick up a TV set. After a bit of an effort I found the place. The old girl told me that her son had replaced the fuse in the set but that it had blown again straight away. It was a Grundig CV720KT/C7400GB, which I'd not come across before, so I carted it downstairs, bunged it in the car and told the owner I'd bring it back within the hour. This seemed to surprise her somewhat.

Back at the shop I took off the rear cover and looked at the chassis. It was a rather small, horizontal one with a few plugs and sockets. There was just one screw to the right of centre, the rest of the panel being held by clips. Having freed this lot and disconnected the plugs etc. I removed the panel and examined it closely. My meter showed a dead short, well almost, across the mains input. It was nothing to do with the degaussing. The meter led me to a bridge rectifier which when removed proved to be the offender.

I looked high and low for a suitable replacement but couldn't find one. So I popped along to Geoff's in Sun Lane and got one from him. As it was larger and the leadouts were different I had to insulate them and turn them over to fit into the right holes. After making sure that I'd fitted it properly I replaced the panel and plugs etc., switched on and plugged in the aerial. There was a good picture and sound. I put the back on and loaded the set into the car, which is easier said than done as it's a small one nowadays. The old girl was delighted when I carted it upstairs and fitted it where she wanted it to live. She paid up happily and in no time I was back home with the dogs and H.B.

"What have you been doing?" she asked.

"Well I've already seen to an old girl," I replied, "and left her very happy I might add."

"Really, after all these years?"

"Just a question of a bridge" I replied, wondering what she would think of next.

## **Fuzzy Picture then Smoke**

For some reason this made me think of another lady I'd visited recently. She'd given her address as number 68 on a certain road and asked me to collect the keys from number 74. When I got there I was surprised to find number 74 next to number 68 and wondered what had happened when the houses had been built. Anyway the lady from number 74 let me into number 68 where I found an ITT CVC5 on the table. Apparently the picture had gone fuzzy then smoke had come from the set. So it was another case of taking the set to the car and the problem of getting it in. I told the lady I'd be back shortly and sped off to the shop. Getting the set in and on to the bench left me breathless, but with the back

removed and the cover taken off the right-hand side line output transformer assembly I could see what had happened.

The line output transformer tag that's connected to the PL509's top cap is also connected to the tripler. The latter lead's insulation had broken down and was shorting to the focus assembly, hence the fuzziness complained about initially. Under the bench I found a stout lead which, after pulling out the three wires, proved to be an adequate cover for the faulty lead in the set. When I'd fitted the cover I arranged the lead clear of the focus assembly and resoldered it to the line output transformer. I then checked that there were no shorts across the h.t. line etc. As everything appeared to be in order I switched on. After the warm-up period a good picture appeared. I left the set on test for a while then returned it to the owner who was now back at number 68. She was happy to pay me my charges after seeing the picture and listening to my puffed voice.

## **Transport**

If you wonder why I get puffed getting sets into and out of the car it's because of the layout. There are just the two front doors, and if a set is put on the passenger's seat it gets in the way of the gear change etc. So I have to move one of the seats forwards and plump the set in the back. H.B. sold the estate car to one of her relatives you see and got this miniature vehicle from another relative, thinking that I wouldn't be doing any more repairs. I keep my mouth shut and put up with it though I'm not happy with the situation despite the reduced petrol consumption.

## **Back at the Ranch**

Having been in the navy you'd think that I would have a preference for rum. Well I did, for a time. After a spell on beer I got on to whisky, which is where the small amount I make on repairs tends to go, me drinking it neat and H.B. taking it in coffee – black with one spoonful of sugar – which I would have thought would water it down. Anyway, I decided to try it like this one night and ended up more sloshed than I did with the neat whisky. Strange that. Maybe it's something to do with my brain: I've not been able to think straight since I reached sixty five.

You might think that the reason this piece is called Triple Trouble is something to do with triplers. It really relates to the dogs however. They haunt me all day (and night). All Alsations, Tess who's the oldest and largest, Zebardi and Gunga – he's the youngest and causes more trouble than the other two put together. The cat still won't come in. She lives outside, sleeping not in the house H.B. made for her but in a car that's been bunged in the space next to the bungalow. Then there's the bird that still has the grudge against whoever puts his finger in her cage. Possibly something to do with having been kept in an army camp and jossled by the squaddies.

## **Liquorish Paper**

I'll just stop a minute to roll myself a cigarette with liquorice paper. Hard way to have a smoke but I told you that I always take the hard way. Another thing is that hand-rolled fags go out quickly when left. So they don't cause fires like those packet ones. I should get a discount on my insurance but I don't. That's enough for now. Cheers to you all.

# The Changing Scene

**Les Lawry-Johns**

I'm sharing the shop at present with S.K. Lakha, who tends to show me up. Take the newsagent's video for instance. I'd spent some time looking at it and got nowhere. Then he brought it in to S.K. who fixed it in minutes. How was I to know that a lamp shuts off the juice to the selectors when it goes open-circuit? Sorry I missed out on that one. I'd better read the magazine more thoroughly, because it was mentioned some time ago in a series of articles in this book of learning.

I also had more trouble with that CVC5 I wrote about a couple of months ago. It started to play up again, so I drove down to see it. The owner told me that it was o.k. for a while then the colours changed on the left-hand side. I stayed and watched it for some time. Then on some scenes the picture became green on the left-hand side, reverting to normal towards the centre. This suggested a fault somewhere in the bistable circuit. After fiddling around for some time I discovered that D40, which links the ident signal to the bistable, was faulty. Should have remembered that. But I think the owner will soon buy a new set. It is, after all, just a little on the old side.

A lady phoned up the other morning to say that all she had was a white line across the screen. She said she'd bought the set from me some years ago and that it was a Philips one. So I thought it was a G11, packed my bags with the Philips stuff – chips and so on – and ventured off to her house. When I got there a Fidelity portable looked at me. As it was a Mk.2 version of the ZX3000 I didn't suspect the line output transformer of causing the trouble. But it was a question of carting it off down to the shop, where L.K. was operating. He was working on a video, but wasn't in a hurry. I plonked the Fidelity on the bench and removed the rear cover. "What's wrong?" he asked. "Field collapse" I replied.

"Let me do it" he said. So I let him snoop around on the main panel, checking resistors etc. Then I thought I'd better do something. Like change the field output chip. I looked for one everywhere but had to go down to Geoff in Sun Lane for one. When I got back S.K. was still looking at the set. We fitted the new chip and of course the white line was still present. Back to checking voltages etc. These proved to be more or less correct, so I felt that it was time to change the timebase generator chip. This involved another visit to Geoff – it's a good thing he keeps his stocks high. When this was fitted we had a full raster and I thought that the job was over.

Connecting the aerial lead produced clear sound but no sign of a picture. My defective memory tried to tell me something, but I didn't want to listen. I put my finger about an inch from the line output transformer and a spark leapt out at it. S.K. looked horrified, but I was o.k. "I've been hearing noises coming from that thing for some time" he said. I thought surely the newer type of transformer, with the integral first anode and focus controls, can't do the same thing as the earlier type, but after some time spent looking for picture content there was a crack and the screen display reverted to the white line. It then became clear. The old girl's not going to fork out for a new line output transformer on top of everything else I

thought. I told her the sad story and left her to think about it. We've not heard since so she's probably decided to buy a new set. Oh well . . .

The point is that these Fidelity sets do tend to suffer from this sort of thing. It starts when the line output transformer sparks over internally. This usually knocks out the video chip and/or the timebase generator chip, depending on the model. So before you go ahead and start to replace the chips, change the line output transformer. With the earlier version this involves altering the focus and first anode supply circuits. All this means that it's wise to get the customer's agreement before you take on the repair.

A G8 that came in later left us in the same position. It seemed to be dead but there was plenty of h.t. It just didn't get to the line output stage because the h.t. fuse was open-circuit. There was no indication of a short-circuit in the line output stage so I fitted a new fuse, crossed my fingers and switched on. A picture appeared but the reds and greens were a bit out. Some time was spent getting this right and I was just admiring the picture when the set went off without warning. More fuses merely confirmed that there was trouble in the line output stage. The customer was told that the repair was likely to be expensive and is still thinking about it – or more likely he's replaced the set. At least I got a fiver for my trouble.

That's all for now. Love from H.B. and the animals, including that bad tempered bird! Finally I'd like to send greetings to my daughter Lavinia who lives with her family in Devon, and to Johnny Logan up north. Lavinia writes for a knitting magazine, producing complicated patterns that are far too involved for us TV people to be able to follow.

**Panasonic**

**NEC**


**FIDELITY**

**PHILIPS**

**G&C**

**THORN**

**and many others**



replaced. A tip: tie a piece of string to the aerial cable before pulling it out – this will enable you to pull the new aerial in with ease. Don't forget to adjust the trimmer to match the aerial to the radio. Adjust for maximum signal or noise with the aerial fully extended and the radio tuned to 200m/1.5MHz.

Some radio receivers/cassette players have an input protection diode in the power lead. Always check this as it can go open- or short-circuit.

The problem we had with one radio receiver that kept coming back was loss of its memory store. A poor car battery was the cause of the problem: when the car was started the voltage would fall to such an extent that the memory would drop out. A new battery worked wonders. Some Fiat radios are designed so that they can be removed when the car is left: a standard cell is incorporated to retain the memory. Use only a DVM when checking these cells – a standard meter will draw current and flatten the cell.

The following things can cause faults: a leaky windscreen can allow water into the radio; if the radio is too close to the car heater the output stage may blow; omission of an earth lead, relying on the aerial lead for the power return, doesn't always work.

Finally, watch out for the following types of aerial: wing mounted; roof mounted; door pillar mounted; windscreen; aerials in the wing mirrors; and finally, for oldies like myself, the aerial under the car – who out there remembers that they pick up the ground wave?!

*B.D. Andrew,  
Devizes, Wilts.*

### HANDSET PROBLEMS

The complaint with a 16in. Philips KT3 teletext portable we had in recently was sound but no picture. When we unplugged the text panel the picture appeared. Several migraines later I decided to try to get the teletext supplement for my KT3 manual, something that's not easy. I even-

tually got one however and can already hear the chorus from other engineers saying "I could have told you what that was". Yes, I eventually found that the fuse in the teletext power supply had gone, removing the rail that provides the TV-text switching voltage. But that wasn't the end of the story.

We returned the set to the customer but the very next day it was back in the workshop with the complaint that "text pages can't be selected and the clock keeps appearing on the screen". I was sure that the set had been all right when I'd tested it with our own handset, and sure enough it was o.k. when retested. When the customer's handset was used however things went to pot and after this the set wouldn't work with our unit. Back to the set. After changing the remote control receiver chip to no avail I resorted to shunting the supply rails with 1.000µF electrolytic capacitors. When this had been done the set would revert to the picture mode. It subsequently responded to my handset then reverted to the index page after which no further selection was possible. More migraines.

I decided to scope the output from the infra-red sensor in the set. A nice healthy waveform appeared when our handset was operated but when the button was released a low-amplitude signal was still displayed. Thinking that there was a fault with our handset I pointed it away from the set and even under the bench, but the low-amplitude signal was still present. I then had a sudden attack of intelligence: I removed the battery from the customer's handset, which had been lying on the bench. Hey presto, the signal disappeared. But the set still wouldn't respond to our handset until it had been switched off and on again. Then perfick.

I had wondered why the battery in the customer's unit seemed to be running down quickly. This was why. The unit had been permanently transmitting the clock call signal, thus jamming and confusing the logic.

*Peter Nutkins,  
Charmouth, Dorset.*

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## OBITUARY

Many of our regular readers will be saddened to learn of the death of Les Lawry-Johns in late August. He had been in poor health for some years, but managed to keep on top of his health problems: he died of a heart attack.

Les joined the Royal Navy Fleet Air Arm early in the war and saw service in the middle east. After the war he returned to Gravesend, Kent, where he started a radio and TV sales and repair business. He became well-known in the area as a local character, in particular for being so helpful to all who came to him with their problems. Some might say too helpful, since he was reluctant to

charge fully for his services.

His long Servicing Television Receivers series started in the September 1954 issue of *Practical Television* (as we then were), with the HMV Model 1807. He went on to cover just about every TV chassis up to and including the earlier all solid-state, single-standard colour chassis. His experience was legendary – he could pinpoint just about every stock fault, and many of those who used the advisory service we then ran benefitted from his know-how. But above all he introduced humour and the human element into his servicing articles. After all repairers have feelings, and customers often present as many

problems as the sets they want repaired. Les felt, rightly we believe, that this overall view was relevant in writing about servicing matters. In addition to the articles that appeared under his own name, he contributed to the magazine under various pen-names such as S. Simon (Simple Simon!) and Peter Gaymead-Frazer – his sense of humour was never far below the surface. Many contributors made a point of paying a visit to the famous shop in Parrock Street.

His death is a great loss to his family, to his many friends and acquaintances in Gravesend and to the *Television* readers he informed and entertained for many years. **J.A.R.**

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